US011756547B2

(12) **United States Patent**
Kim et al.

(10) **Patent No.: US 11,756,547 B2**
(45) **Date of Patent: Sep. 12, 2023**

(54) **METHOD FOR PROVIDING SCREEN IN ARTIFICIAL INTELLIGENCE VIRTUAL ASSISTANT SERVICE, AND USER TERMINAL DEVICE AND SERVER FOR SUPPORTING SAME**

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(73) Assignee: **Samsung Electronics Co., Ltd**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 279 days.

(21) Appl. No.: **17/420,926**

(22) PCT Filed: **Jun. 29, 2021**

(86) PCT No.: **PCT/KR2021/008176**
§ 371 (c)(1),
(2) Date: **Jul. 6, 2021**

(87) PCT Pub. No.: **WO2022/010157**
PCT Pub. Date: **Jan. 13, 2022**

(65) **Prior Publication Data**

US 2023/0142110 A1 May 11, 2023

(30) **Foreign Application Priority Data**

Jul. 6, 2020 (KR) 10-2020-0083095

(51) **Int. Cl.**
G10L 15/22 (2006.01)
G06F 3/16 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G10L 15/22*** (2013.01); ***G06F 3/167*** (2013.01); ***G10L 15/1815*** (2013.01); ***G10L 15/30*** (2013.01); *G10L 2015/223* (2013.01)

(58) **Field of Classification Search**
USPC 704/1–504
See application file for complete search history.

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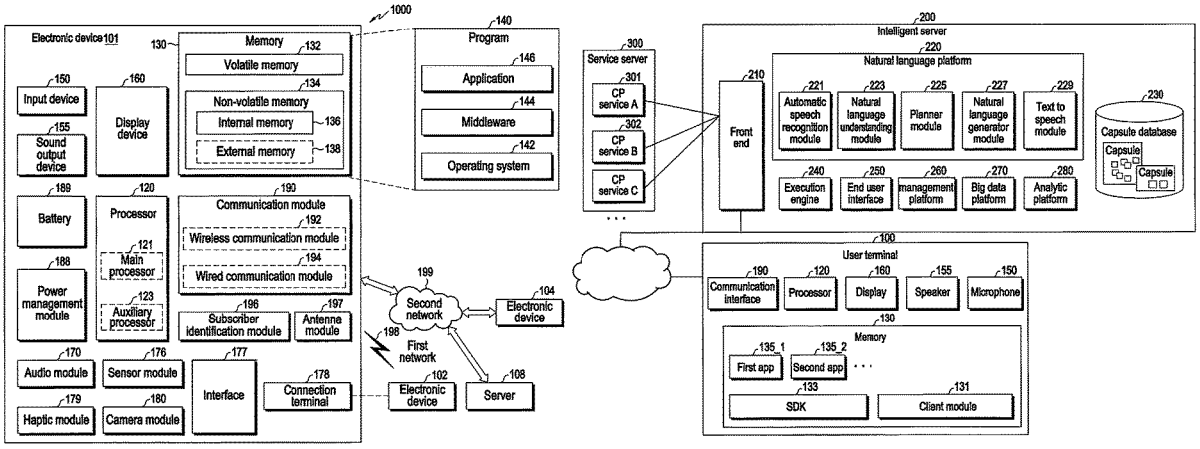
(74) *Attorney, Agent, or Firm* — The Farrell Law Firm, P.C.

(57) **ABSTRACT**

A user terminal device includes a display; at least one sensor; a communication module; and a processor operatively connected to the display, the at least one sensor, and the communication module, wherein the processor is configured to, based on receiving a user utterance voice, determine whether or not a response screen corresponding to the user utterance voice is able to be provided through the display on the basis of at least one of a sensed value obtained from the at least one sensor or an inactive period of the display, based on determining that the response screen is unable to be provided through the display, receive current status information of at least one external device connected
(Continued)



to the user terminal device through the communication module, determine one external device among the at least one external device to display the response screen on the basis of the current status information of the at least one external device, obtain the response screen to the user utterance voice, and transmit the response screen to the one external device through the communication module.

15 Claims, 13 Drawing Sheets

(51) **Int. Cl.**
G10L 15/18 (2013.01)
G10L 15/30 (2013.01)

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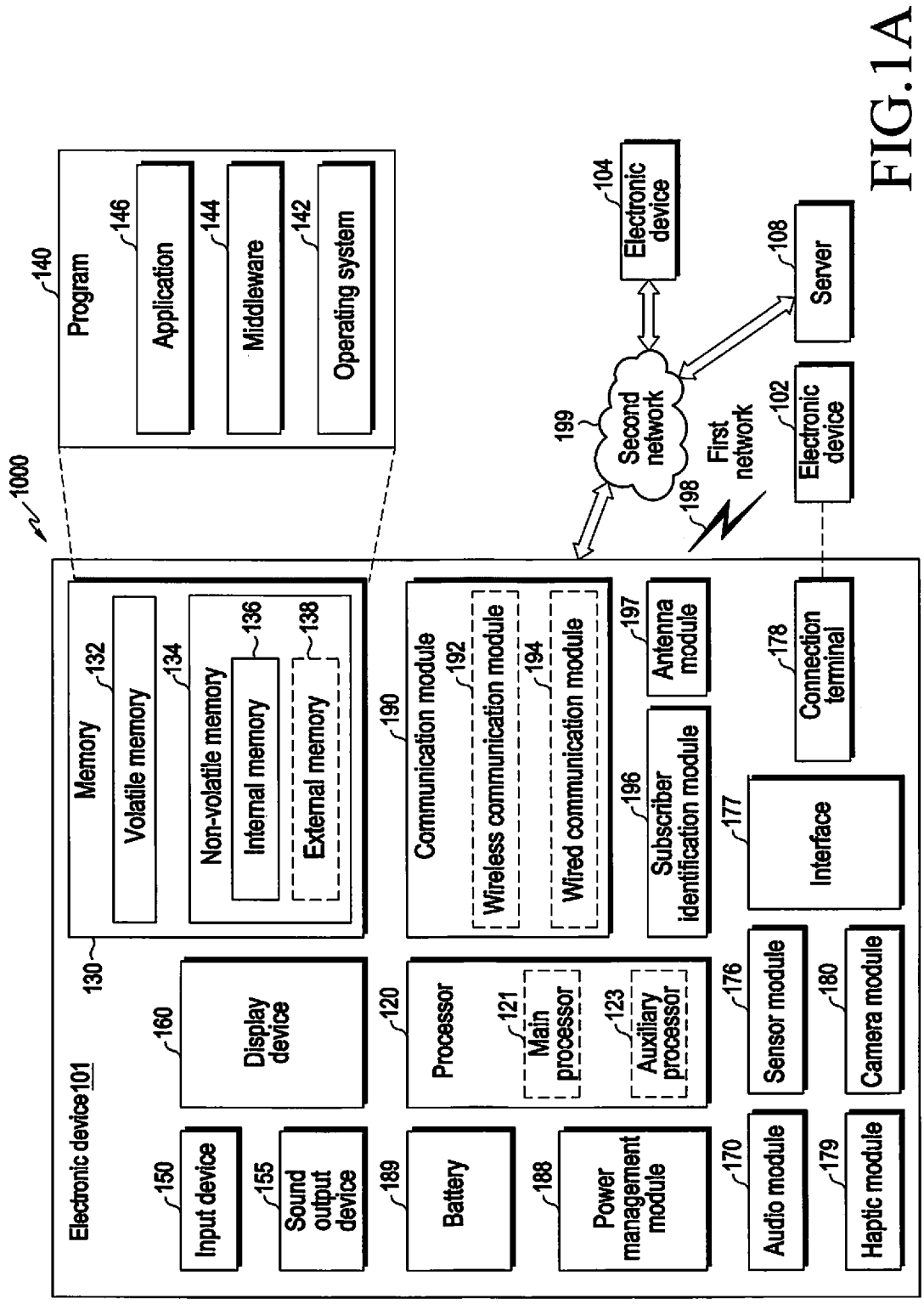
1000
Electronic device 101
130
Memory
132
Volatile memory
134
Non-volatile memory
136
Internal memory
138
External memory
140
Program
146
Application
144
Middleware
142
Operating system
150
Input device
155
Sound output device
160
Display device
189
Battery
188
Power management module
120
Processor
121
Main processor
123
Auxiliary processor
190
Communication module
192
Wireless communication module
194
Wired communication module
196
Subscriber identification module
197
Antenna module
176
Sensor module
177
Interface
178
Connection terminal
170
Audio module
180
Camera module
179
Haptic module
199
Second network
198
First network
104
Electronic device
102
Electronic device
108
Server

FIG. 1A

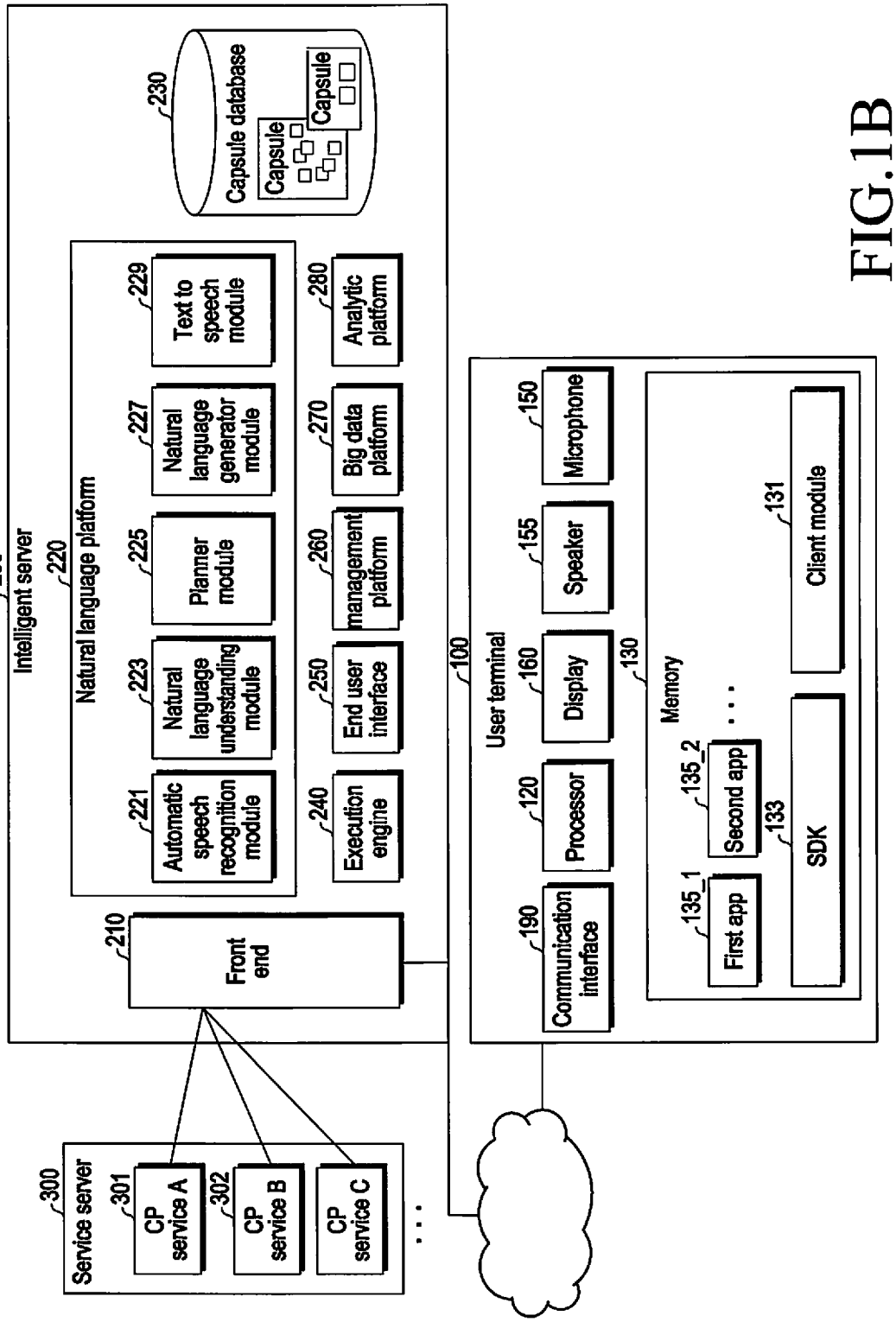
200
Intelligent server
220
Natural language platform
221
Automatic speech recognition module
223
Natural language understanding module
225
Planner module
227
Natural language generator module
229
Text to speech module
230
Capsule database
Capsule
Capsule
240
Execution engine
250
End user interface
260
management platform
270
Big data platform
280
Analytic platform
210
Front end
100
User terminal
120
Processor
130
Memory
131
Client module
133
SDK
135_1
First app
135_2
Second app
150
Microphone
155
Speaker
160
Display
190
Communication interface
300
Service server
301
CP service A
302
CP service B
CP service C

FIG.1B

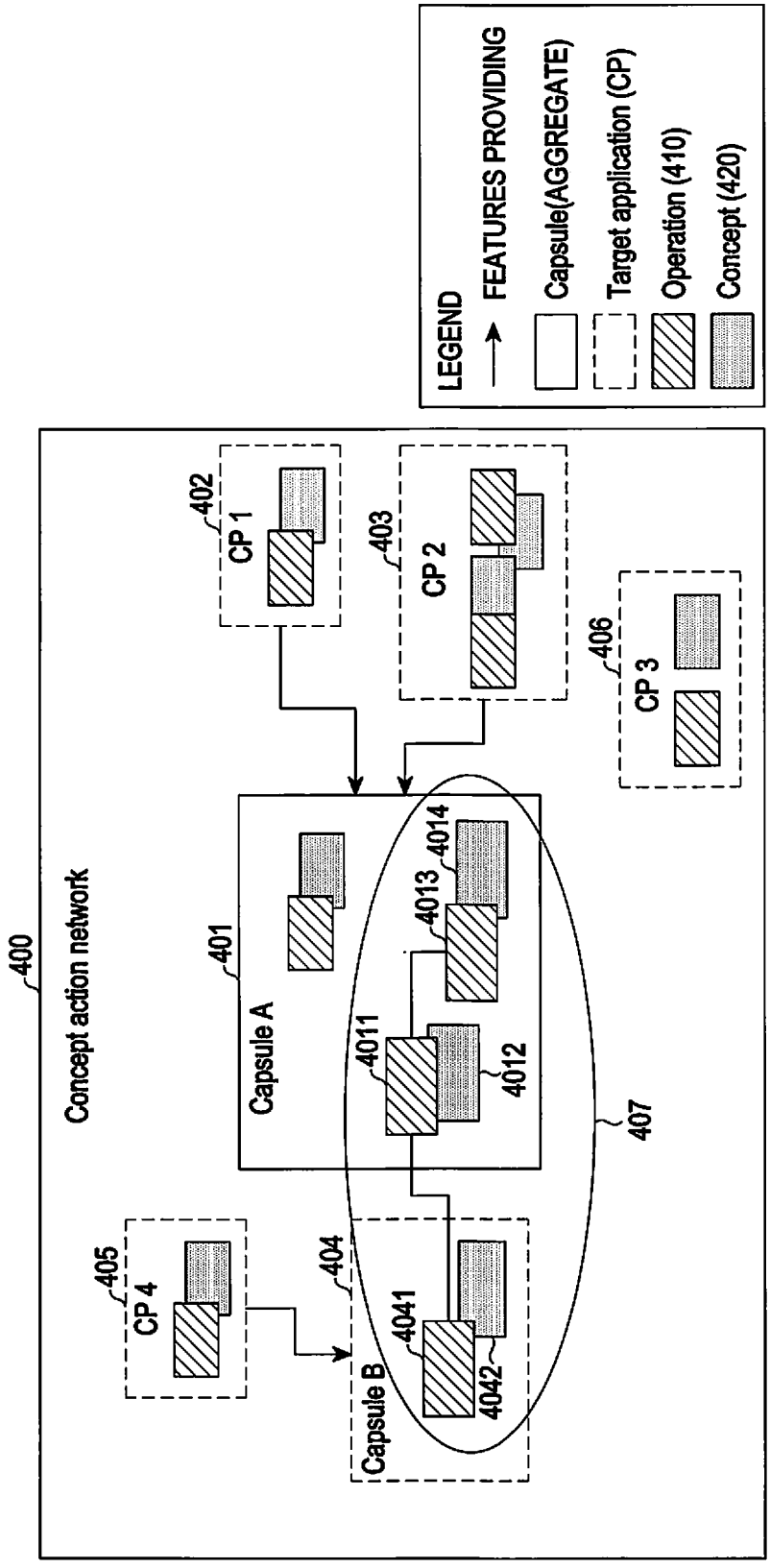
LEGEND
FEATURES PROVIDING
Capsule(AGGREGATE)
Target application (CP)
Operation (410)
Concept (420)
400
Concept action network
401
Capsule A
402
CP 1
403
CP 2
404
Capsule B
405
CP 4
406
CP 3
407
4011
4012
4013
4014
4041
4042

FIG.2

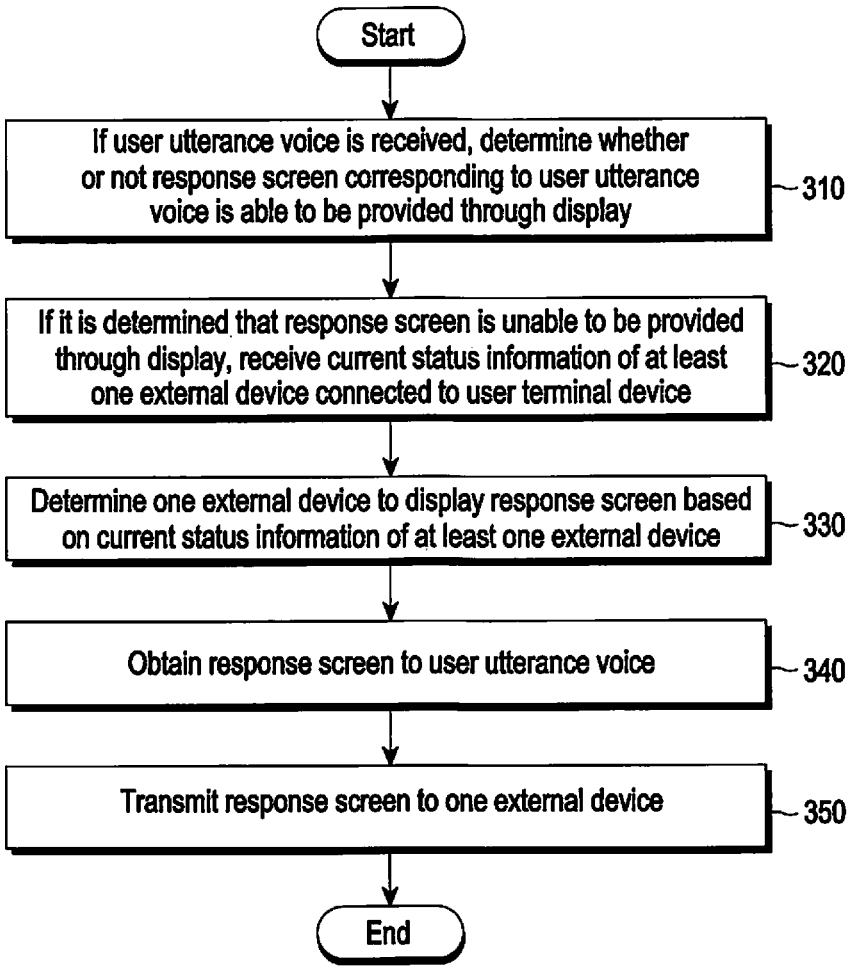
Start
If user utterance voice is received, determine whether or not response screen corresponding to user utterance voice is able to be provided through display
310
If it is determined that response screen is unable to be provided through display, receive current status information of at least one external device connected to user terminal device
320
Determine one external device to display response screen based on current status information of at least one external device
330
Obtain response screen to user utterance voice
340
Transmit response screen to one external device
350
End

FIG.3

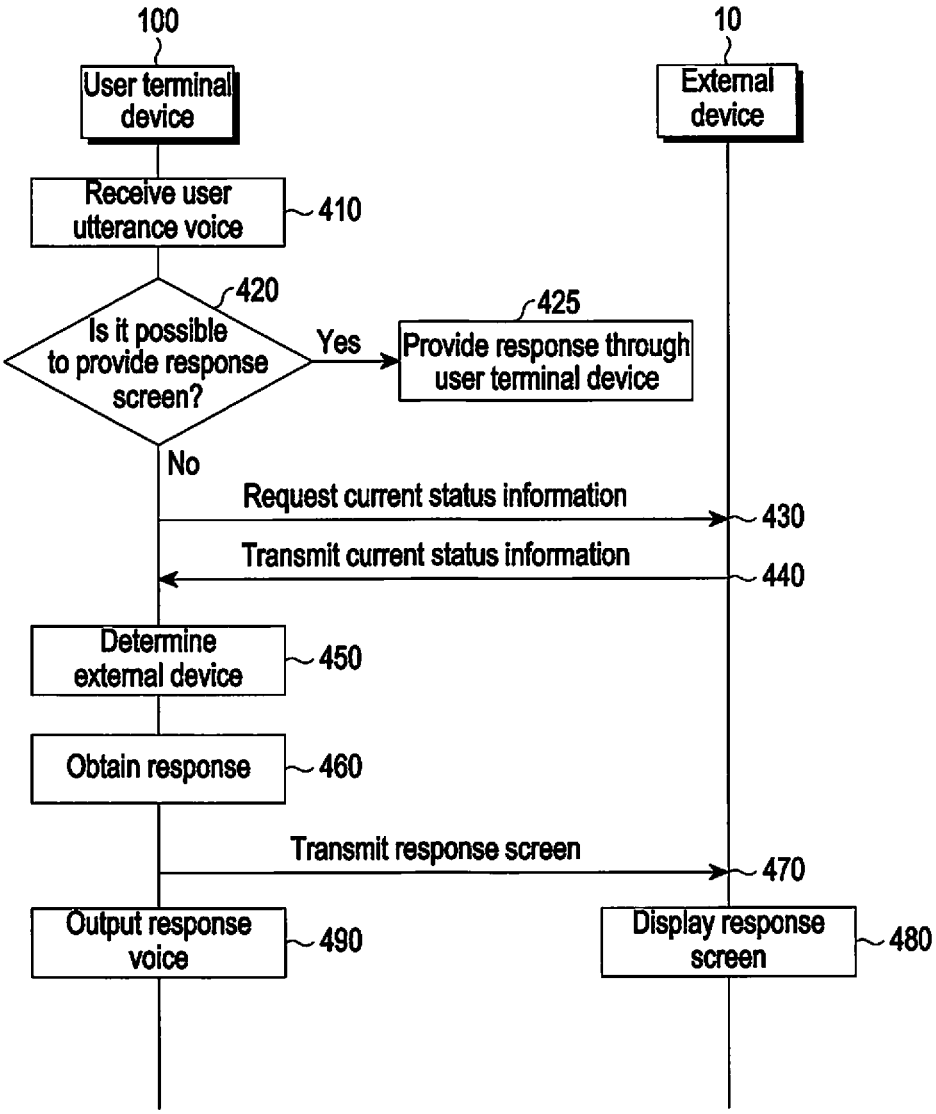
100
User terminal device
10
External device
Receive user utterance voice
410
420
Is it possible to provide response screen?
Yes
425
Provide response through user terminal device
No
Request current status information
430
Transmit current status information
440
Determine external device
450
Obtain response
460
Transmit response screen
470
Output response voice
490
Display response screen
480

FIG.4

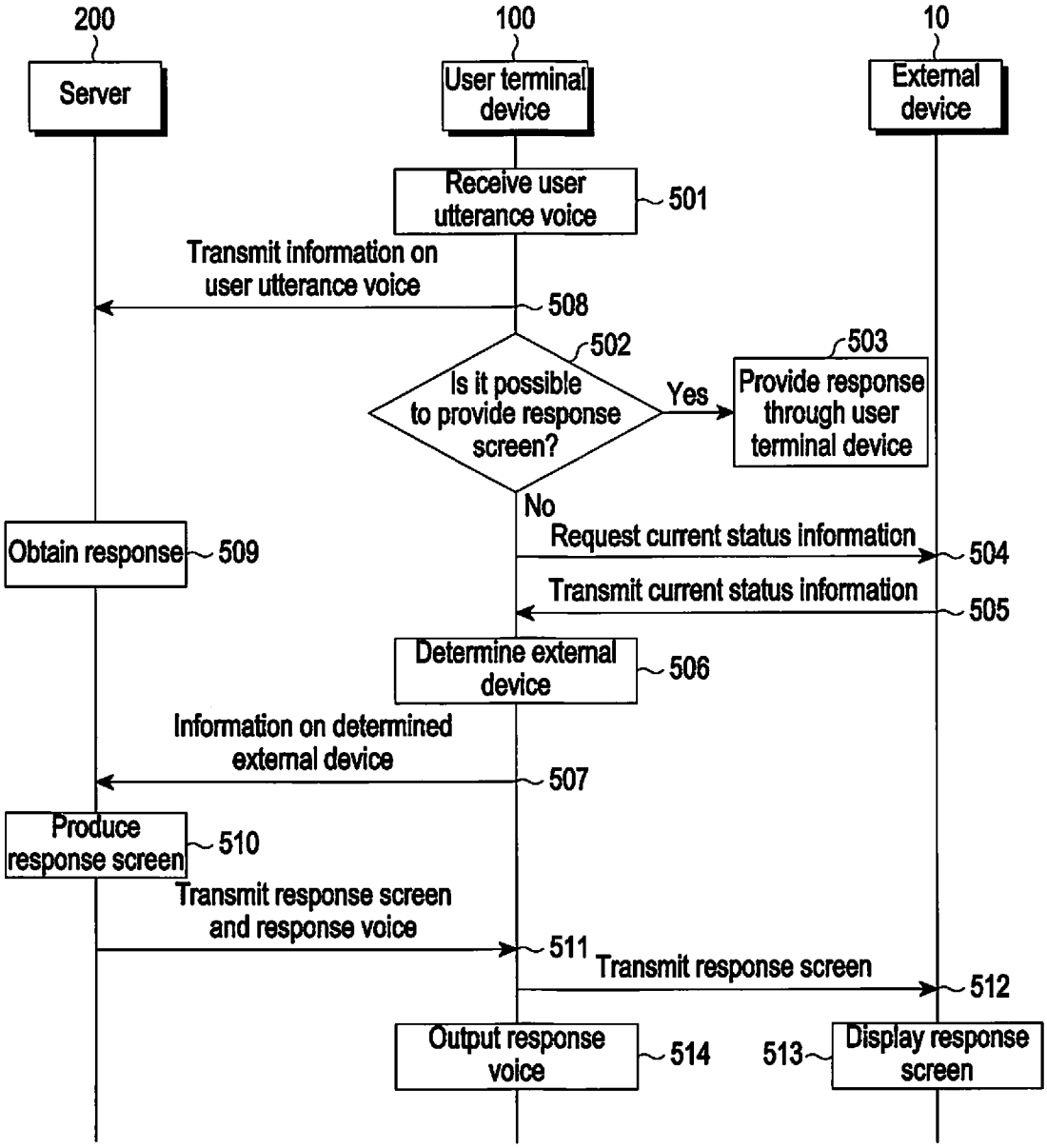
200
Server
100
User terminal device
10
External device
Receive user utterance voice
501
Transmit information on user utterance voice
508
502
Is it possible to provide response screen?
Yes
503
Provide response through user terminal device
No
Obtain response
509
Request current status information
504
Transmit current status information
505
Determine external device
506
Information on determined external device
507
Produce response screen
510
Transmit response screen and response voice
511
Transmit response screen
512
Output response voice
514
513
Display response screen

FIG.5

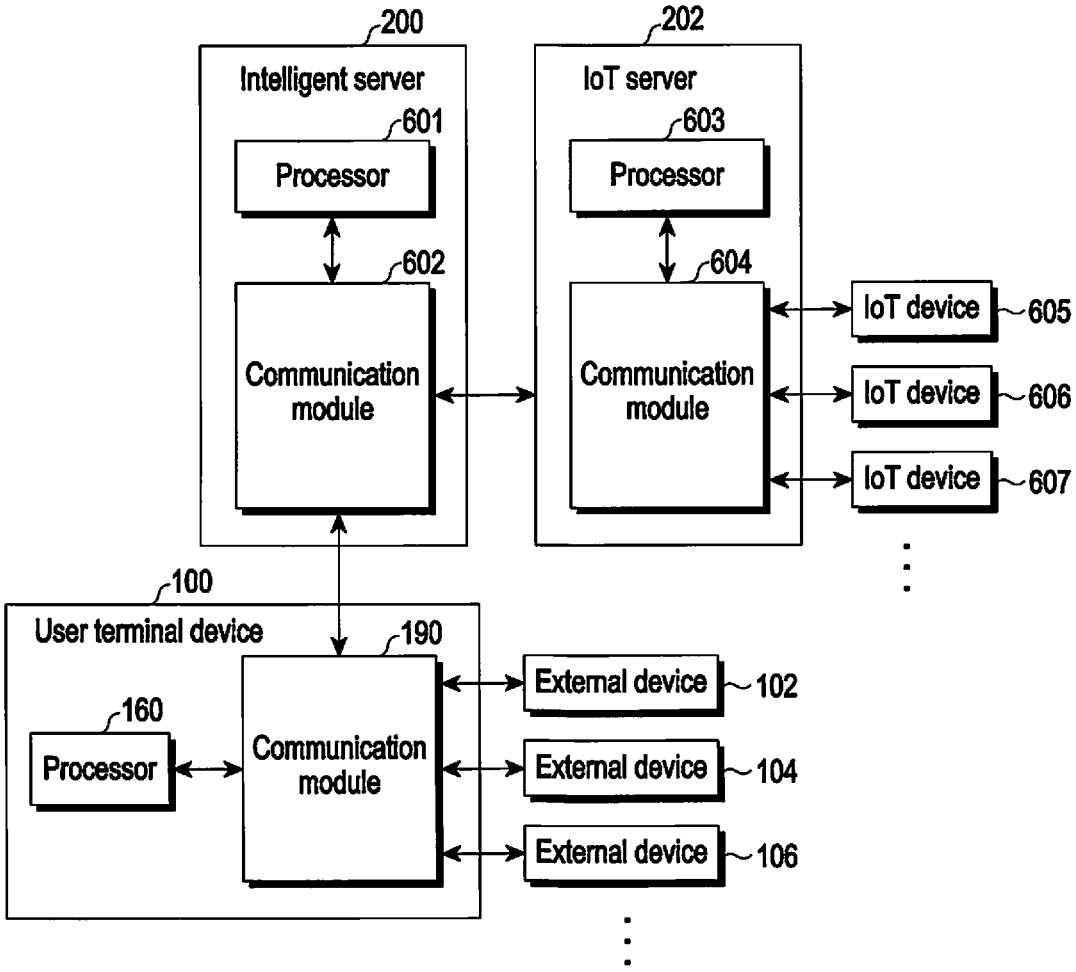
200
Intelligent server
601
Processor
602
Communication module
202
IoT server
603
Processor
604
Communication module
IoT device
605
IoT device
606
IoT device
607
100
User terminal device
190
160
Processor
Communication module
External device
102
External device
104
External device
106

FIG.6

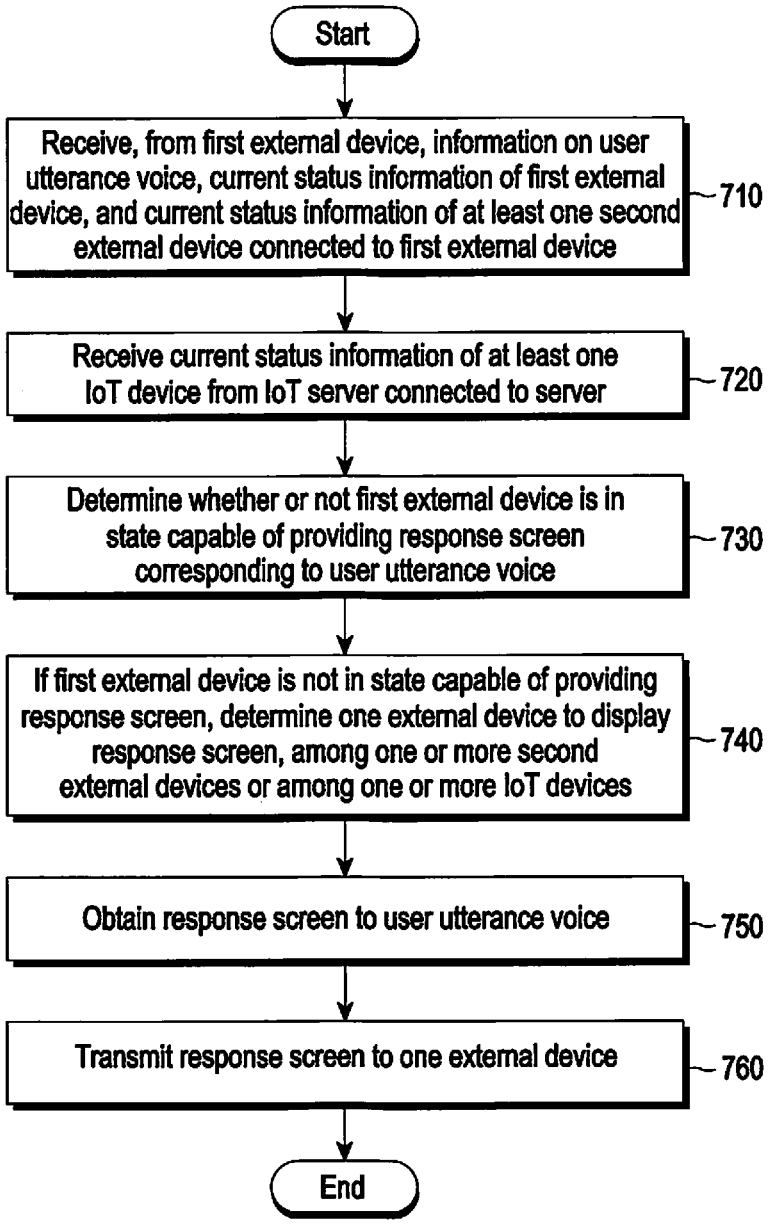
Start
Receive, from first external device, information on user utterance voice, current status information of first external device, and current status information of at least one second external device connected to first external device
710
Receive current status information of at least one IoT device from IoT server connected to server
720
Determine whether or not first external device is in state capable of providing response screen corresponding to user utterance voice
730
If first external device is not in state capable of providing response screen, determine one external device to display response screen, among one or more second external devices or among one or more IoT devices
740
Obtain response screen to user utterance voice
750
Transmit response screen to one external device
760
End

FIG.7

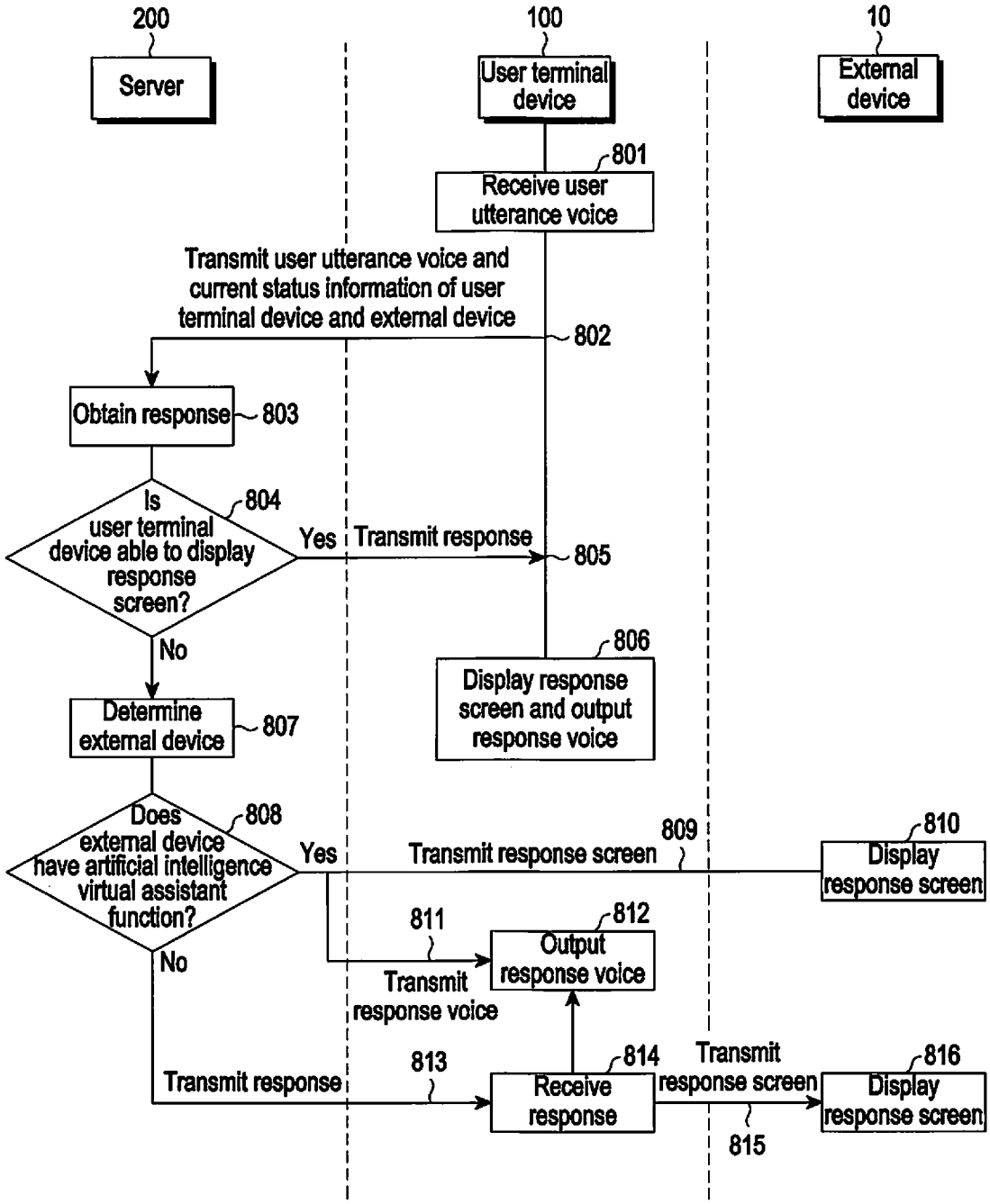
200
Server
100
User terminal device
10
External device
801
Receive user utterance voice
Transmit user utterance voice and current status information of user terminal device and external device
802
Obtain response
803
Is user terminal device able to display response screen?
804
Yes
Transmit response
805
No
806
Display response screen and output response voice
Determine external device
807
Does external device have artificial intelligence virtual assistant function?
808
Yes
Transmit response screen
809
810
Display response screen
811
Transmit response voice
812
Output response voice
No
813
Transmit response
814
Receive response
Transmit response screen
815
816
Display response screen

FIG.8

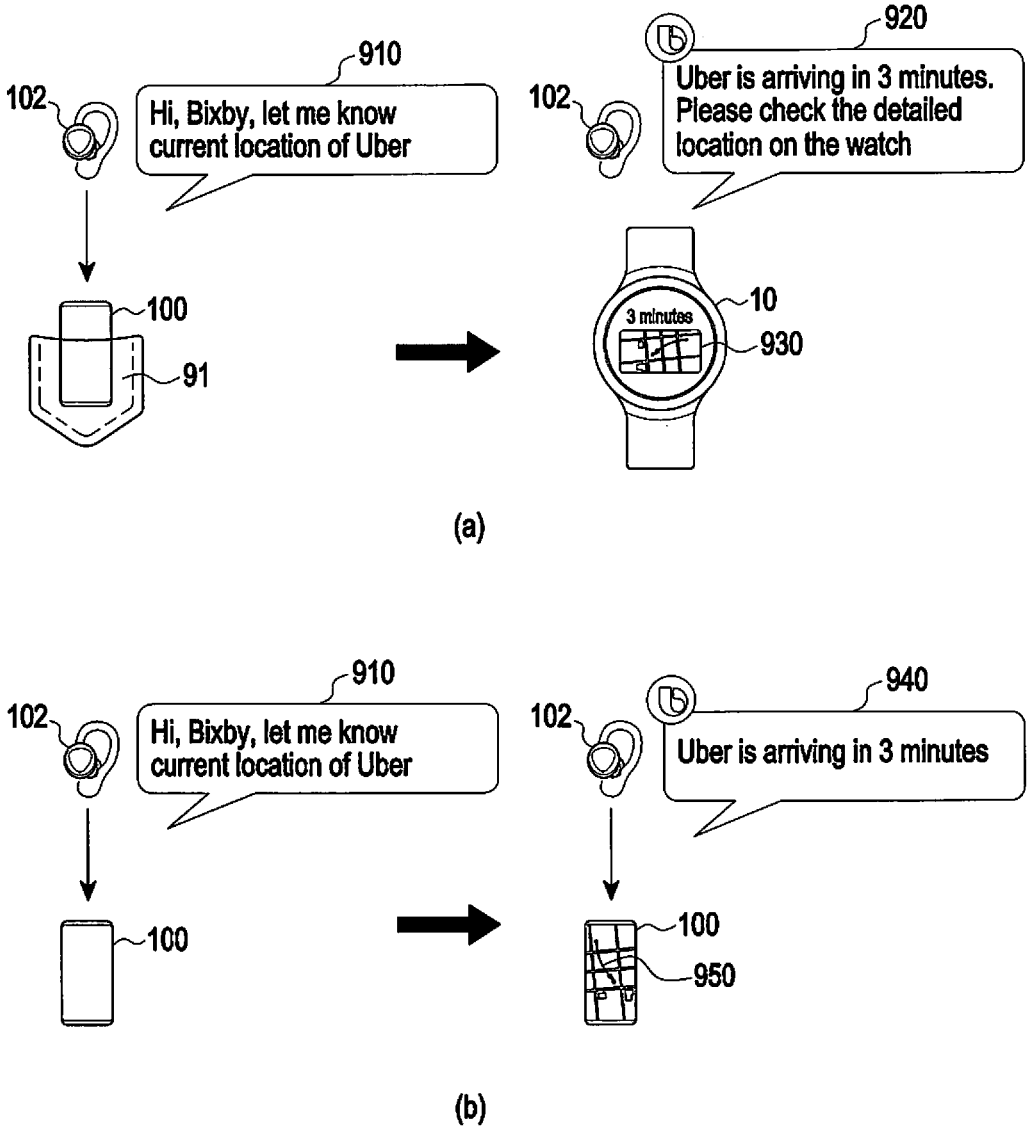
910
102
Hi, Bixby, let me know current location of Uber
100
91
920
102
Uber is arriving in 3 minutes. Please check the detailed location on the watch
3 minutes
10
930
(a)
910
102
Hi, Bixby, let me know current location of Uber
100
940
102
Uber is arriving in 3 minutes
100
950
(b)

FIG.9

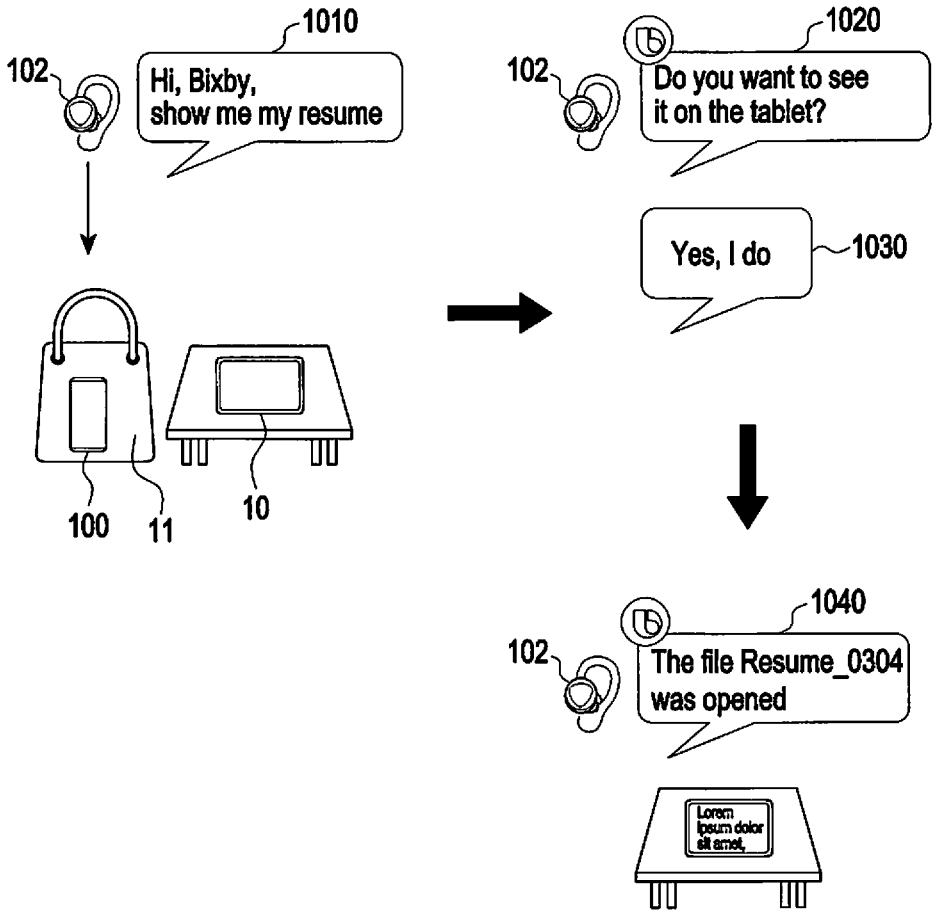
1010
102
Hi, Bixby,
show me my resume
100
11
10
1020
102
Do you want to see
it on the tablet?
Yes, I do
1030
1040
102
The file Resume_0304
was opened
Lorem
Ipsum dolor
sit amet,

FIG.10

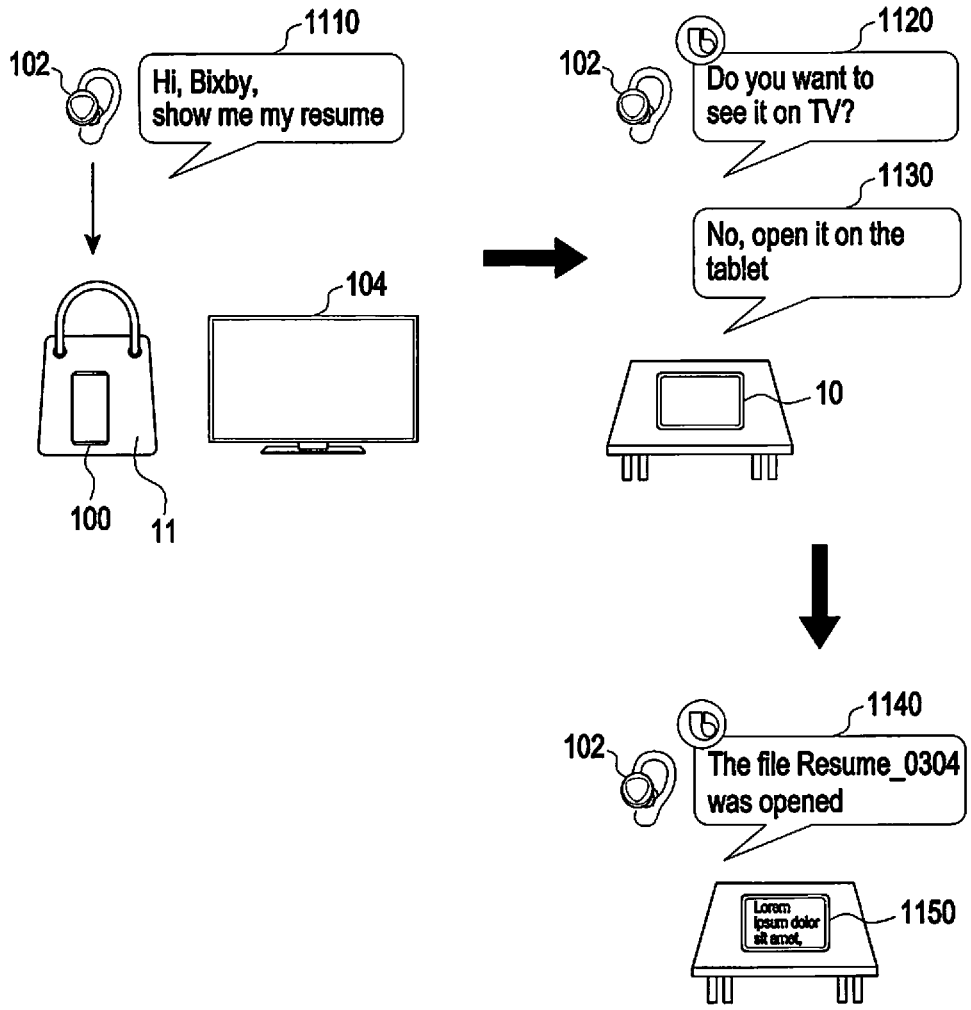
1110
102
Hi, Bixby,
show me my resume
104
100
11
1120
102
Do you want to
see it on TV?
1130
No, open it on the
tablet
10
1140
102
The file Resume_0304
was opened
Lorem
ipsum dolor
sit amet,
1150

FIG.11

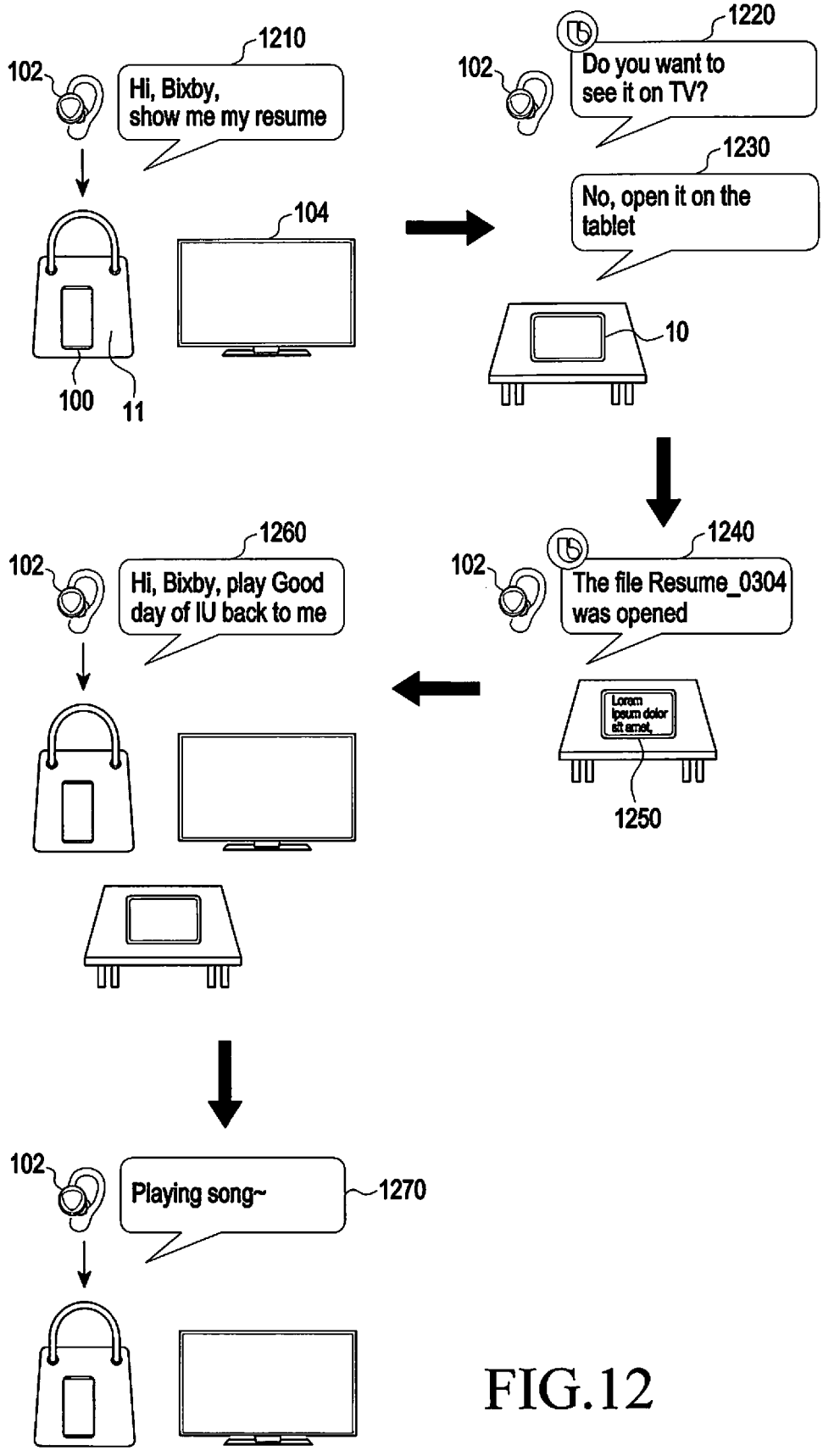
1210
102
Hi, Bixby,
show me my resume
104
100
11
1220
102
Do you want to
see it on TV?
1230
No, open it on the
tablet
10
1240
102
The file Resume_0304
was opened
Loram
Ipsum dolor
sit amet,
1250
1260
102
Hi, Bixby, play Good
day of IU back to me
102
Playing song~
1270

FIG.12

METHOD FOR PROVIDING SCREEN IN ARTIFICIAL INTELLIGENCE VIRTUAL ASSISTANT SERVICE, AND USER TERMINAL DEVICE AND SERVER FOR SUPPORTING SAME

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is a National Phase Entry of PCT International Application No. PCT/KR2021/008176, which was filed on Jun. 29, 2021, and claims priority to Korean Patent Application No. 10-2020-0083095 which was filed on Jul. 6, 2020, in the Korean Intellectual Property Office, the contents of which are incorporated herein by reference.

BACKGROUND

1. Field

Various embodiments relate to a method of providing a screen in an artificial intelligence virtual assistant service and an electronic device supporting the same.

2. Description of Related Art

Artificial intelligence systems have been utilized in various fields. Unlike an existing rule-based smart system, the artificial intelligence system is a system in which a machine learns and judges by itself to become smarter. As the artificial intelligence system is used more, a recognition rate thereof improves, and user's preferences are more accurately understood. Accordingly, existing rule-based smart systems are being gradually replaced by the deep-learning-based artificial intelligence systems.

Recently, various services using artificial intelligence virtual assistants (e.g., Bixby™, Assistant™, and Alexa™) providing responses to user voice inputs have been provided.

Various functions of an electronic device may be controlled by inputting voice commands through a microphone included in wireless earphones connected to the electronic device even without directly controlling the electronic device using a touch screen or physical buttons of the electronic device.

However, artificial intelligence virtual assistant services assume that the user is looking at the screen. Accordingly, artificial intelligence virtual assistant services communicate with the user through a voice, and also provide visual information through a display of the electronic device, thereby performing a complementary operation.

Therefore, in the case where the user is unable to view the display of the electronic device providing the artificial intelligence virtual assistant service because the electronic device is in a bag or pocket, or because the electronic device is located far away from the user, there is an inconvenience of relying only on auditory information in order to use the artificial intelligence virtual assistant service.

SUMMARY

The present disclosure has been made to address the above-mentioned problems and disadvantages, and to provide at least the advantages described below.

According to an aspect of the present disclosure, a user terminal device includes a display; at least one sensor; a communication module; and a processor operatively connected to the display, the at least one sensor, and the communication module, wherein the processor is configured, if a user utterance voice is received, to determine whether or not a response screen corresponding to the user utterance voice is able to be provided through the display on the basis of at least one of a sensed value obtained from the at least one sensor or an inactive period of the display, if it is determined that the response screen is unable to be provided through the display, to receive current status information of at least one external device connected to the user terminal device through the communication module, to determine one external device to display the response screen on the basis of the current status information of the at least one external device, to obtain the response screen to the user utterance voice, and to transmit the response screen to the one external device through the communication module.

According to another aspect of the present disclosure, a server may include a communication module; and a processor operatively connected to the communication module, wherein the processor may be configured to receive, from a first external device that receives a user utterance voice, information on the user utterance voice, current status information of the first external device, and current status information of at least one second external device connected to the first external device through the communication module, to receive current status information of at least one IoT device from an IoT server connected to the server through the communication module, based on sensing information of the first external device, to determine whether or not the first external device is in a state capable of providing a response screen corresponding to the user utterance voice, if it is determined that the first external device is not in the state capable of providing the response screen, to determine one external device to display the response screen on the basis of at least one piece of the current status information of the at least one second external device or the current status information of the at least one IoT device, to obtain the response screen to the user utterance voice, and to transmit the response screen corresponding to the user utterance voice to the one external device through the communication module.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features, and advantages of certain embodiments of the present disclosure will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIG. **1**A is a block diagram of an electronic device in a network environment according to various embodiments;

FIG. **1**B is a block diagram illustrating an integrated intelligence system according to an embodiment;

FIG. **2** is a diagram illustrating the state in which relationship information between concepts and actions is stored in a database according to an embodiment;

FIG. **3** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment;

FIG. **4** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment;

FIG. **5** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment;

FIG. **6** is a diagram illustrating a network environment of an artificial intelligence virtual assistant service according to an embodiment;

FIG. **7** is a diagram illustrating an operation of providing a screen by a server in an artificial intelligence virtual assistant service according to an embodiment;

FIG. **8** is a diagram illustrating an operation of providing a screen by a server in an artificial intelligence virtual assistant service according to an embodiment;

FIG. **9** is a diagram illustrating an embodiment of an operation of providing a screen in an artificial intelligence virtual assistant service according to the disclosure,

FIG. **10** is a diagram illustrating an embodiment of an operation of providing a screen in an artificial intelligence virtual assistant service according to the disclosure;

FIG. **11** is a diagram illustrating an embodiment of an operation of providing a screen in an artificial intelligence virtual assistant service according to the disclosure; and

FIG. **12** is a diagram illustrating an embodiment of an operation of providing a screen in an artificial intelligence virtual assistant service according to the disclosure.

DETAILED DESCRIPTION

Various embodiments of the present disclosure are described with reference to the accompanying drawings. However, various embodiments of the present disclosure are not limited to particular embodiments, and it should be understood that modifications, equivalents, and/or alternatives of the embodiments described herein can be variously made. With regard to description of drawings, similar components may be marked by similar reference numerals.

Various embodiments are intended to provide a method for providing a screen in an artificial intelligence virtual assistant service, which enables the user to be provided with visual information using other electronic devices around the user even when the user is unable to view a display of an electronic device, and to further provide a user terminal device and a server supporting the same.

In order to recognize a user's voice and analyze the intention of the user to obtain a response, a method for providing a screen by a user terminal device or a server in an artificial intelligence virtual assistant service may include receiving a user utterance voice signal from an external device through a communication module or receiving a voice signal, which is an analog signal, through a microphone, and converting the voice into computer-readable text using an automatic speech recognition (ASR) model. The converted text may be analyzed using a natural language understanding (NLU) model to obtain the utterance intention of the user. According to an embodiment, the ASR model or the NLU model may include an artificial intelligence model.

According to an embodiment, the artificial intelligence model may be processed by an artificial intelligence-dedicated processor designed in a hardware structure specialized for processing the artificial intelligence model. Artificial intelligence models may be produced through learning. Producing the artificial intelligence models through learning may indicate that predefined operation rules or artificial intelligence models, which are configured to perform desired characteristics (or purposes), are produced by an operation in which a basic artificial intelligence model performs learning by a learning algorithm using multiple pieces of learning data.

According to an embodiment, the artificial intelligence model may be configured as a plurality of neural network layers. Each of the plurality of neural network layers may have a plurality of weight values, and may perform a neural network operation through an operation between the result of a previous layer and the plurality of weight values.

Linguistic understanding may indicate the technology of recognizing, applying, and/or processing human language and/or characters, and may include natural language processing, machine translation, a dialog system, question answering, speed recognition, and/or speech synthesis.

FIG. **1A** is a block diagram illustrating an electronic device **101** in a network environment **1000** according to various embodiments. Referring to FIG. **1A**, the electronic device **101** in the network environment **1000** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**. According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input module **150**, a sound output module **155**, a display module **160**, an audio module **170**, a sensor module **176**, an interface **177**, a connecting terminal **178**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In some embodiments, at least one of the components (e.g., the connecting terminal **178**) may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. In some embodiments, some of the components (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) may be implemented as a single component (e.g., the display module **160**).

The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to one embodiment, as at least part of the data processing or computation, the processor **120** may store a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor **123** (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. For example, when the electronic device **101** includes the main processor **121** and the auxiliary processor **123**, the auxiliary processor **123** may be adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

The auxiliary processor **123** may control, for example, at least some of functions or states related to at least one component (e.g., the display module **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active (e.g., executing an application) state. According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of

another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**. According to an embodiment, the auxiliary processor **123** (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. An artificial intelligence model may be generated by machine learning. Such learning may be performed, e.g., by the electronic device **101** where the artificial intelligence is performed or via a separate server (e.g., the server **108**). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted Boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

The input module **150** may receive a command or data to be used by another component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input module **150** may include, for example, a microphone, a mouse, a keyboard, a key (e.g., a button), or a digital pen (e.g., a stylus pen).

The sound output module **155** may output sound signals to the outside of the electronic device **101**. The sound output module **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

The display module **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display module **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display module **160** may include a touch sensor adapted to detect a touch, or a pressure sensor adapted to measure the intensity of force incurred by the touch.

The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input module **150**, or output the sound via the sound output module **155** or an external electronic device (e.g., an electronic device **102** (e.g., a speaker or a headphone)) directly or wirelessly coupled with the electronic device **101**.

The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.

The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.

The power management module **188** may manage power supplied to the electronic device **101**. According to one embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device **104** via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the second network **199** (e.g., a long-range communication network, such as a

legacy cellular network, a 5G network, a next-generation communication network, the Internet, or a computer network (e.g., LAN or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify or authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.

The wireless communication module **192** may support a 5G network, after a 4G network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module **192** may support a high-frequency band (e.g., the mmWave band) to achieve, e.g., a high data transmission rate. The wireless communication module **192** may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication module **192** may support various requirements specified in the electronic device **101**, an external electronic device (e.g., the electronic device **104**), or a network system (e.g., the second network **199**). According to an embodiment, the wireless communication module **192** may support a peak data rate (e.g., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for implementing URLLC.

The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. According to an embodiment, the antenna module **197** may include an antenna including a radiating element composed of a conductive material or a conductive pattern formed in or on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module **197** may include a plurality of antennas (e.g., array antennas). In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.

According to various embodiments, the antenna module **197** may form an mmWave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, an RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mmWave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

According to an embodiment, commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. Each of the electronic devices **102** or **104** may be a device of a same type as, or a different type, from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102**, **104**, or **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device **101** may provide ultra low-latency services using, e.g., distributed computing or mobile edge computing. In another embodiment, the external electronic device **104** may include an Internet-of-things (IoT) device. The server **108** may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device **104** or the server **108** may be included in the second network **199**. The electronic device **101** may be applied to intelligent services (e.g., smart home, smart city, smart car, or healthcare) based on 5G communication technology or IoT-related technology.

FIG. **1B** is a block diagram illustrating an integrated intelligence system according to an embodiment.

Referring to FIG. **1B**, the integrated intelligence system according to an embodiment may include a user terminal **100**, an intelligent server **200**, and a service server **300**.

The user terminal **100** (e.g., the electronic device **101** in FIG. **1B**) according to an embodiment may be a terminal device (or an electronic device) connectable to the Internet, such as mobile phones, smart phones, personal digital assistants (PDAs), notebook computers, TV sets, home appliances, wearable devices, HMDs, or smart speakers.

According to the illustrated embodiment, the user terminal **100** may include a communication module **190**, a microphone **150**, a speaker **155**, a display **160**, a memory **130**, or a processor **120**. The elements listed above may be operatively or electrically connected to each other.

The communication module **190** (e.g., the communication module **190** in FIG. **1A**) according to an embodiment may be configured to transmit and receive data while being connected to an external device. The microphone **150** (e.g., the input module **150** in FIG. **1A**) according to an embodiment may receive sound (e.g., a user utterance), and may

convert the same into an electrical signal. The speaker **155** (e.g., the sound output module **155** in FIG. **1**A) according to an embodiment may output an electrical signal in the form of sound (e.g., voice). The display **160** (e.g., the display module **160** in FIG. **1**A) according to an embodiment may be configured to display images or videos. The display **160** according to an embodiment may display graphic user interfaces (GUIs) of executed apps (or application programs).

The memory **130** (e.g., the memory **130** in FIG. **1**A) according to an embodiment may store a client module **131**, a software development kit (SDK) **133**, and a plurality of apps **135**. The client module **131** and the SDK **133** may configure a framework (or a solution program) for executing general functions. In addition, the client module **131** or the SDK **133** may configure a framework for processing a voice input.

In the memory **130** of an embodiment, the plurality of apps **135** may be programs for executing specified functions. According to an embodiment, the plurality of apps **135** may include a first app **135_1** and a second app **135_2**. According to an embodiment, each of the plurality of apps **135** may include a plurality of operations for performing specified functions. For example, the apps may include an alarm app, a message app, and/or a schedule app. According to an embodiment, the plurality of apps **135** may be executed by the processor **120** (e.g., the provide **120** in FIG. **1**A), thereby sequentially executing at least some of the plurality of operations.

The processor **120** in an embodiment may control the overall operation of the user terminal **100**. For example, the processor **120** may be electrically connected to the communication module **190**, the microphone **150**, the speaker **155**, and the display **160**, and may perform specified operations.

The processor **120** in an embodiment may also execute a program stored in the memory **130** to perform a specified function. For example, the processor **120** may execute at least one of the client module **131** or the SDK **133**, thereby performing the following operation for processing a voice input. The processor **120**, for example, may control the operation of the plurality of apps **135** through the SDK **133**. The following operation described as the operation of the client module **131** or the SDK **133** may be the operation executed by the processor **120**.

The client module **131** according to an embodiment may receive a voice input. For example, the client module **131** may receive a voice signal corresponding to a user utterance detected through the microphone **150**. The client module **131** may transmit the received voice input to the intelligent server **200** (e.g., the server **108** in FIG. **1**A). The client module **131** may transmit status information of the user terminal **100** to the intelligent server **200** along with the received voice input. The status information, for example, may be information on the execution status of the app.

The client module **131** according to an embodiment may receive a result corresponding to the received voice input. For example, if the intelligent server **200** is able to produce a result corresponding to the received voice input, the client module **131** may receive the result corresponding to the received voice input. The client module **131** may display the received result on the display **160**.

The client module **131** according to an embodiment may receive a plan corresponding to the received voice input. The client module **131** may display results of executing a plurality of operations of the app according to the plan on the display **160**. The client module **131**, for example, may sequentially display the execution results of the plurality of operations on the display. Additionally or alternatively, the user terminal **100** may display only some of the execution results of the plurality of operations (e.g., the result of the last operation) on the display.

According to an embodiment, the client module **131** may receive, from the intelligent server **200**, a request for obtaining information required to produce the result corresponding to the voice input. According to an embodiment, the client module **131** may transmit the required information to the intelligent server **200** in response to the request.

The client module **131** according to an embodiment may transmit information on the results of executing a plurality of operations according to the plan to the intelligent server **200**. The intelligent server **200** may identify that the received voice input has been correctly processed through the result information.

The client module **131** according to an embodiment may include a speech recognition module. According to an embodiment, the client module **131** may recognize a voice input performing a limited function through the speech recognition module. For example, the client module **131** may perform an intelligent app for processing a voice input for executing collaborative operations through a specified input (e.g., "Wake up!").

The intelligent server **200** according to an embodiment may receive information related to a user voice input from the user terminal **100** through a communication network. According to an embodiment, the intelligent server **200** may convert data related to the received voice input into text data. According to an embodiment, the intelligent server **200** may produce a plan for performing a task corresponding to the user voice input on the basis of the text data.

According to an embodiment, the plan may be produced by an artificial intelligence (AI) system. The artificial intelligence system may be a rule-based system, or may be a neural network-based system {e.g., a feedforward neural network (FNN) or a recurrent neural network (RNN)}. Alternatively, the artificial intelligence system may be a combination of the above systems, or may be another artificial intelligence system. According to an embodiment, the plan may be selected from a set of predefined plans, or may be produced in real time in response to a request by the user. For example, the artificial intelligence system may select at least one plan from among a plurality of predefined plans.

The intelligent server **200** according to an embodiment may transmit a result according to the produced plan to the user terminal **100**, or may transmit the produced plan to the user terminal **100**. According to an embodiment, the user terminal **100** may display the result according to the plan on the display. According to an embodiment, the user terminal **100** may display the result of executing the operation according to the plan on the display.

The intelligent server **200** according to an embodiment may include a front end **210**, a natural language platform **220**, a capsule database (DB) **230**, an execution engine **240**, an end user interface **250**, a management platform **260**, a big data platform **270**, or an analytic platform **280**.

The front end **210** according to an embodiment may receive a voice input from the user terminal **100**. The front end **210** may transmit a response to the voice input.

According to an embodiment, the natural language platform **220** may include an automatic speech recognition (ASR) module **221**, a natural language understanding (NLU) module **223**, a planner module **225**, a natural language generator (NLG) module **227**, or a text-to-speech (TTS) module **229**.

The automatic speech recognition module **221** according to an embodiment may convert a voice input received from the user terminal **100** into text data. The natural language understanding module **223** according to an embodiment may recognize the intention of the user using the text data of the voice input. For example, the natural language understanding module **223** may perform a syntactic analysis or a semantic analysis, thereby recognizing the intention of the user. The natural language understanding module **223** according to an embodiment may recognize the meaning of a word extracted from the voice input using the linguistic features (e.g., syntactic elements) of morphemes or phrases, and may match the recognized meaning of the word to the intention, thereby determining the intention of the user.

The planner module **225** according to an embodiment may produce a plan using the intention determined in the natural language understanding module **223** and parameters. According to an embodiment, the planner module **225** may determine a plurality of domains required to perform the task on the basis of the determined intention. The planner module **225** may determine a plurality of operations included in each of a plurality of domains determined based on the intention. According to an embodiment, the planner module **225** may determine parameters required to execute the plurality of determined operations or result values output by executing the plurality of operations. The parameter and the result values may be defined as concepts of a designated format (or class). Accordingly, the plan may include a plurality of operations determined based on the intention of the user, and a plurality of concepts. The planner module **225** may determine the relationship between the plurality of operations and the plurality of concepts by stages (or hierarchically). For example, the planner module **225** may determine the order of executing a plurality of operations determined based on the intention of the user on the basis of the plurality of concepts. In other words, the planner module **225** may determine the order of executing a plurality of operations on the basis of the parameters necessary for the execution of the plurality of operations and the results output by execution of the plurality of operations. Accordingly, the planner module **225** may produce a plan including relationship information (e.g., ontology information) between a plurality of operations and a plurality of concepts. The planner module **225** may produce a plan using information stored in the capsule database **230** that stores a set of relationships between concepts and operations.

The natural language generator module **227** according to an embodiment may convert specified information into text. The information converted into the text may be in the form of a natural language utterance. The text-to-speech module **229** according to an embodiment may convert information in the form of text into information in the form of a voice.

According to an embodiment, some or all of the functions of the natural language platform **220** may be implemented in the user terminal **100** as well.

The capsule database **230** may store information on the relationship between a plurality of concepts and operations corresponding to a plurality of domains. The capsule according to an embodiment may include a plurality of action objects (or action information) and concept objects (concept information) included in the plan. According to an embodiment, the capsule database **230** may store a plurality of capsules in the form of a concept action network (CAN). According to an embodiment, a plurality of capsules may be stored in a function registry included in the capsule data **230**.

The capsule database **230** may include a strategy registry that stores strategy information required to determine the plan corresponding to the voice input. If there is a plurality of plans corresponding to the voice input, the strategy information may include reference information for determining one plan. According to an embodiment, the capsule database **230** may include a follow-up registry that stores information on subsequent operations in order to propose the subsequent operation to the user in a specified situation. The subsequent operations may include, for example, subsequent utterance. According to an embodiment, the capsule database **230** may include a layout registry that stores information on the layout of information output through the user terminal **100**. According to an embodiment, the capsule database **230** may include a vocabulary registry that stores vocabulary information included in the capsule information. According to an embodiment, the capsule database **230** may include a dialog registry that stores information on the dialogs (or interactions) with the user. The capsule database **230** may update the stored objects through a developer tool. The developer tool may include, for example, a function editor for updating the action objects or the concept objects. The developer tool may include a vocabulary editor for updating vocabulary. The developer tool may include a strategy editor for producing and registering the strategy for determining the plan. The developer tool may include a dialog editor for producing a dialog with the user. The developer tool may include a follow-up editor capable of activating a subsequent goal and editing a subsequent utterance that provides hints. The subsequent goal may be determined based on the currently configured goal, user preference, or environmental conditions. In an embodiment, the capsule data **230** may also be implemented in the user terminal **100**.

The execution engine **240** according to an embodiment may produce a result using the produced plan. The end user interface **250** may transmit the produced result to the user terminal **100**. Accordingly, the user terminal **100** may receive the result, and may provide the received result to the user. The management platform **260** according to an embodiment may manage information used in the intelligent server **200**. The big data platform **270** in an embodiment may collect user data. The analytic platform **280** according to an embodiment may manage the quality of service (QoS) of the intelligent server **200**. For example, the analytic platform **280** may manage the components and the processing speed (or efficiency) of the intelligent server **200**.

The service server **300** according to an embodiment may provide a specified service (e.g., order food or reserve hotel) to the user terminal **100**. According to an embodiment, the service server **300** may be a server operated by a third party. The service server **300** according to an embodiment may provide the intelligent server **200** with information for producing the plan corresponding to the received voice input. The provided information may be stored in the capsule database **230**. In addition, the service server **300** may provide information on the result according to the plan to the intelligent server **200**.

In the integrated intelligence system described above, the user terminal **100** may provide various intelligent services to the user in response to a user input. The user input, for example, may include an input through a physical button, a touch input, or a voice input.

In an embodiment, the user terminal **100** may provide speech recognition services through an intelligent app (or a speech recognition app) stored therein. In this case, for example, the user terminal **100** may recognize a user utter-

ance or a voice input received through the microphone, and may provide a service corresponding to the recognized voice input to the user.

In an embodiment, the user terminal **100** may perform a specified operation alone or together with the intelligent server and/or the service server on the basis of the received voice input. For example, the user terminal **100** may execute an app corresponding to the received voice input, and may perform a specified operation through the executed app.

In an embodiment, in the case in which the user terminal **100** provides a service together with the intelligent server **200** and/or the service server, the user terminal may detect a user utterance using the microphone **150**, and may generate a signal (or voice data) corresponding to the detected user utterance. The user terminal may transmit the voice data to the intelligent server **200** using the communication module **190**.

In response to the voice input received from the user terminal **100**, the intelligent server **200** according to an embodiment may produce a plan for performing the task corresponding to the voice input, or results of performing the operation according to the plan. The plan may include, for example, a plurality of operations for performing the task corresponding to the user voice input and a plurality of concepts related to the plurality of operations. The concepts may be defined as parameters that are input for execution of the plurality of operations or result values that are output by execution of the plurality of operations. The plan may include information on the relationship between the plurality of operations and the plurality of concepts.

The user terminal **100** according to an embodiment may receive the response using the communication module **190**. The user terminal **100** may output a voice signal generated inside the user terminal **100** to the outside using the speaker **155**, or may output an image produced inside the user terminal **100** to the outside using the display **160**.

FIG. **2** is a diagram illustrating the state in which relationship information between concepts and operations is stored in a database according to various embodiments.

A capsule database (e.g., the capsule database **230**) of the intelligent server **200** may store capsules in the form of a concept action network (CAN). The capsule database may store operations for processing the tasks corresponding to the user voice inputs and parameters required for the operations in the form of a CAN.

The capsule database may store a plurality of capsules (capsule A **401** and capsule B **404**) corresponding to respective domains (e.g., applications). According to an embodiment, one capsule (e.g., capsule A **401**) may correspond to one domain (e.g., a location (geo) or an application). In addition, one capsule may correspond to at least one service provider (e.g., CP 1 **402** or CP 2 **403**) for performing a function for the domain related to the capsule. According to an embodiment, one capsule may include one or more operations **4100** and one or more concepts **4200** in order to perform specified functions.

The natural language platform **220** may produce a plan for performing a task corresponding to the received voice input using the capsules stored in the capsule database. For example, the planner module **225** of the natural language platform may produce a plan using the capsules stored in the capsule database. For example, a plan **407** may be produced using operations **4011** and **4013** and concepts **4012** and **4014** of capsule A **401**, and an operation **4041** and a concept **4042** of capsule B **404**.

FIG. **3** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment.

According to various embodiments, in operation **310**, if a user utterance voice is received, a user terminal device (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine whether or not a response screen corresponding to the user utterance voice is able to be provided through a display (e.g., the display **160**). According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive a user utterance voice through a microphone (e.g., the microphone **150**) included therein or an external microphone connected thereto. For example, the connected external microphone may be a microphone included in a wearable device (e.g., wireless earphones) already connected to the user terminal device **100** through wireless communication.

According to various embodiments, when the user utterance voice is received, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine whether or not the response screen corresponding to the user utterance voice is able to be provided through the display **160** on the basis of at least one of a sensed value obtained from at least one sensor or an inactive period of the display **160**. According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may include at least one sensor. For example, at least one sensor may detect the operating state (e.g., power or temperature) of the user terminal device **100** or the external environmental state (e.g., the user state), and may generate an electrical signal or a data value corresponding to the detected state. For example, the at least one sensor may include a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

For example, if at least one of conditions in which a sensed value obtained through an illuminance sensor included therein is less than a predetermined value, in which a sensed value obtained through a proximity sensor is less than a predetermined value, or in which the display **160** remains in an inactive state for a predetermined period or more is satisfied, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine that the response screen corresponding to the user utterance voice is unable to be provided through the display **160** (e.g., the state in which the device is inside a bag or pocket). According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain the distance to the user on the basis of at least one of the intensity of the user utterance voice received through the microphone included therein or the strength of a signal {e.g., an ultra-wideband (UWB) signal or a Bluetooth signal) from a wearable device already connected through wireless communication, and may determine whether or not the response screen corre-

sponding to the user utterance voice is able to be provided through the display **160** by further considering the obtained distance to the user.

According to various embodiments, in operation **320**, if it is determined that the response screen is unable to be provided through the display **160**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive current status information of at least one external device connected to the user terminal device **100**. For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive, from each external device connected to the user terminal device **100**, current status information including at least one of a running application, whether or not a video is being played, strength of a communication signal (e.g., a Wi-Fi signal, a UWB signal, a Bluetooth™ signal, or a Bluetooth™ low energy (BLE) signal), or a battery level.

According to various embodiments, at least one external device connected to the user terminal device **100** may be an electronic device including a display, such as a tablet PC, a smart refrigerator, a smart watch, smart glasses, or a smart TV set. Additionally or alternatively, at least one external device connected to the user terminal device **100** may be an IoT server connected to at least one IoT device including a display.

According to various embodiments, in operation **330**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine one external device to display the response screen on the basis of the current status information of at least one external device. For example, if an external device is currently displaying a screen according to execution of an application or is currently playing video content, or if the strength of a communication signal and the battery level of the external device are less than predetermined values, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine that the external device is unable to display the response screen. For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine the external device whose display is available, whose battery level is a predetermined value or more, and whose strength of a communication signal is a maximum, among one or more external devices, to be one external device to display the response screen.

According to various embodiments, if a user utterance voice is received through an external microphone connected to the user terminal device **100**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may further consider the location of the external microphone that obtained the user utterance voice, thereby determining one external device to display the response screen. For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine the external device closest to the location of the external microphone, among one or more external devices, to be the external device to display the response screen.

According to various embodiments, in operation **340**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain response screen to the user utterance voice. According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may include an automatic voice recognition module, a natural language understanding module, and a natural language generator module.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain response text to the user utterance voice received using the automatic voice recognition module, the natural language understanding module, and the natural language generator module. For example, in order for the user terminal device **100** to obtain a response to the voice, for the user utterance voice associated with the task stored in a memory (e.g., the memory **130**) of the user terminal device **100**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain a response through the voice recognition module, the natural language understanding module, and the natural language generator module included in the processor **120**. For example, the obtained response may be response text to the user utterance voice. According to various embodiments, the automatic voice recognition module, the natural language understanding module, and the natural language generator module included in the processor **120** may perform at least some of the operations of the automatic voice recognition module **221**, the natural language understanding module **223**, and the natural language generator module **227** shown in FIG. **1**B.

According to various embodiments, if a user utterance voice related to the task that is not stored in the memory **130** is received, or if a user utterance voice having a predetermined length or more is received, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the user utterance voice to a server (e.g., the intelligent server **200**) for processing the voice. According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive, from the server (e.g., the intelligent server **200**), a response screen to the transmitted user utterance voice. An embodiment of obtaining the response to the user utterance voice through the server will be described below with reference to FIGS. **5** to **8**.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen on the basis of the obtained response text and/or information on a display included in the one determined external device. For example, if the obtained response text is intended to request a response from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen by further including a plurality of examples for selection by the user. Additionally or alternatively, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen by further including visual content related to the obtained response text.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen on the basis of information about a display included in one determined external device (e.g., a size, a shape, or displayable colors of the display).

According to various embodiments, in operation **350**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the response screen to one determined external device. According to various embodiments, the one determined external device may display the received response screen on the display included therein.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output a response voice through a speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the user terminal device **100** or an external speaker connected thereto. For example, the external speaker may be the speaker included in a wearable device already connected to the user terminal device **100** through wireless communication. According to various embodiments, the response voice may include information on the external device in order to allow the user to view the external device. Accordingly, the user may view the response screen displayed on the external device while listening to the response voice output from the user terminal device **100**.

FIG. **4** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment. According to various embodiments, in FIG. **4**, the user terminal device **100** may perform an operation of determining an external device **10** to display a response screen and an operation of obtaining a response to a user utterance voice.

According to various embodiments, the user terminal device **100** (or an electronic device) (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive a user utterance voice in operation **410**. According to various embodiments, in operation **420**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine whether or not user terminal device is able to provide a response screen to the user utterance voice. Since operations **410** and **420** are the same as operation **310** in FIG. **3**, duplicate descriptions thereof will be omitted.

According to various embodiments, if it is determined that the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) is able to provide a response screen ("YES" in operation **420**), in operation **425**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine to provide a response through the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B). According to various embodiments, if it is determined that the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) is unable to provide a response screen ("NO" in operation **420**), the electronic device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B), in operation **430**, may request current status information from at least one external device (e.g., the external device **10**) connected to the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B).

According to various embodiments, in operation **440**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive current status information from each external device (e.g., the external device **10**). For example, the current status information may include at least one of hardware information of at least one external device (e.g., at least one of identification information, model information, or capability information), a running application, whether or not video content is being played, strength of a communication signal, or a battery level in each external device (e.g., the external device **10**).

Although only one external device **10** is illustrated in FIG. **4**, according to various embodiments, it is possible to request current status information from two or more external devices connected to the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) and to receive current status information of two or more external devices.

According to various embodiments, in operation **450**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine the external device **10** to display the response screen corresponding to the user utterance voice on the basis of the received current status information of at least one external device. Since operation **450** is the same as operation **330** in FIG. **3**, a duplicate description thereof will be omitted.

According to various embodiments, in operation **460**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain a response to the user utterance voice. For example, the response to the user utterance voice may include at least one of a response screen and a response voice.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may include an automatic speech recognition module, a natural language understanding module, and a natural language generator module. For example, if a user utterance voice related to the task stored in a memory (e.g., the memory **130** in FIG. **1**A or the memory **130** in FIG. **1**B) is received, or if a user voice of less than a predetermined length is received, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain response text through the automatic speech recognition module, the natural language understanding module, and the natural language generator module, which are included therein.

According to various embodiments, if a user utterance voice related to the task that is not stored in the memory **130** is received, or if a user utterance voice having a predetermined length or more is received, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the user utterance voice to a server

(e.g., the server **108** in FIG. **1**A or the intelligent server **200** in FIG. **1**B) for processing the voice. An embodiment of obtaining a response to the user utterance voice through a server will be described below with reference to FIGS. **5** to **8**.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen on the basis of the obtained response text and information on a display included in one determined external device. For example, if the obtained response text is intended to request a response from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen by further including a plurality of examples for selection by the user. Additionally or alternatively, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen by further including visual content related to the obtained response text.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may produce a response screen on the basis of information about a display included in one determined external device (e.g., a size, a shape, or displayable colors of the display).

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may include a text-to-speech module. According to various embodiments, the text-to-speech module may perform at least some operations of the text-to-speech module **229** in FIG. **1**B. According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may obtain a response voice corresponding to the response text through the text-to-speech module. According to various embodiments, the response voice may include information on the external device so as to allow the user to view the external device.

Although FIG. **4** shows that the response is obtained after determining the external device, according to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may perform the operation of obtaining the response prior to the operation of determining the external device, or may simultaneously perform at least part of the operation of obtaining the response with the operation of determining the external device (operation **450**). For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine the external device on the basis of a result of automatic voice recognition after performing automatic voice recognition for the user utterance voice. For example, if the user utterance voice includes an external device to display a response screen as a result of performing the automatic voice recognition operation for the user utterance voice, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine the external device included in the user utterance voice to be the external device to display the response screen.

According to various embodiments, in operation **470**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the response screen to the determined external device **10**.

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output a request for confirmation from the user on whether or not to display the response screen on the determined external device **10**. For example, if a tablet is determined to be the external device **10** to display the response screen, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output a voice saying "Do you want to display the screen on the tablet?" through a speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) or an external speaker connected to the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B). According to various embodiments, when a command (e.g., a voice command) to display the response screen on the determined external device **10** is received from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the response screen to the determined external device **10**. According to another embodiment, a command (e.g., a voice command) to display the response screen through an external device other than the determined external device **10** is received from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the response screen to the external device included in the command.

According to various embodiments, in operation **480**, the external device **10** may display the response screen received from the user terminal device **100** on the display included therein.

According to various embodiments, in operation **490**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output the obtained response voice through the speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the user terminal device **100** or an external speaker connected thereto. According to various embodiments, the response voice may include information on the external device **10** so as to allow the user to view the external device **10**.

According to various embodiments, after the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) transmits the response screen to the external device **10**, the user may input a manipulation command through the response screen displayed on the external device **10**. According to various embodiments, when the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) receives, from the external device **10**, a signal corresponding

to the user manipulation command input by the user, the user terminal device may perform an operation corresponding to the user manipulation command.

According to various embodiments, after the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) transmits the response screen to the external device **10**, if the user terminal device switches to the state capable of providing the response screen through a display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B), the user terminal device may transmit a signal for stopping the display of the response screen to the external device **10**, and may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B). For example, while displaying the response screen through the external device **10**, if the user terminal device **100** switches to the state capable of providing the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) (e.g., the state in which the user terminal device is taken out of a pocket or bag) according to a sensed value obtained from at least one sensor (e.g., an illuminance sensor, a gyro sensor, or an acceleration sensor), or if the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) is activated, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit a signal for stopping the display of the response screen to the external device **10**, and may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B). According to various embodiments, when the user terminal device switches to the state capable of providing the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B), the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive confirmation from the user on whether or not to provide the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B). For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit a confirmation message to the external device **10** so as to display the confirmation message on the display of the external device **10**, or may output a voice making a request for confirmation through a speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the user terminal device **100** or an external speaker connected thereto. According to various embodiments, when a user command regarding whether or not to provide the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) is input, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may maintain the response screen displayed in the external device **10**, or may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) on the basis of the input user command.

FIG. **5** is a diagram illustrating an operation of providing a screen by a user terminal device in an artificial intelligence virtual assistant service according to an embodiment. According to various embodiments, FIG. **5** shows an operation in which a user terminal device **100** determines an external device **10** to display a response screen and an operation in which a server **200** obtains a response to a user utterance voice.

According to various embodiments, in operation **501**, the user terminal device **100** (or an electronic device) (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive a user utterance voice. According to various embodiments, in operation **502**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine whether or not the user terminal device is able to provide a response screen to the user utterance voice.

According to various embodiments, if it is determined that the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) is able to provide the response screen ("YES" in operation **502**), in operation **503**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine to provide a response through the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B). According to various embodiments, if it is determined that the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) is unable to provide the response screen ("NO" in operation **502**), the electronic device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may request current status information from at least one external device (e.g., the external device **10**) connected to the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) in operation **504**.

According to various embodiments, in operation **505**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may receive current status information from each external device (e.g., the external device **10**). For example, the current status information may include at least one of a running application, whether or not video content is being played, strength of a communication signal, or a battery level in each external device (e.g., the external device **10**).

According to various embodiments, in operation **506**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may determine an external device **10** to display a response screen corresponding to the user utterance voice on the basis of the received current status information of at least one external device (e.g., the external device **10**). Since operations **501** to **506** are the same as operation **410** to **450** in FIG. **4**, and duplicate descriptions thereof will be omitted.

According to various embodiments, in operation **507**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit information on the determined external device to a server (e.g., the intelligent server **200**). For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit ID information includ-

ing information on the device type of the determined external device to the server (e.g., the intelligent server **200**).

According to various embodiments, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output a request for confirmation from the user on whether or not to display the response screen on the determined external device **10**. For example, if a tablet is determined to be the external device **10** to display the response screen, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output a voice saying "Do you want to display the screen on the tablet?" through a speaker (e.g., the speaker **155**) included in the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) or an external speaker connected to the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B). According to various embodiments, when a command (e.g., a voice command) to display the response screen on the determined external device **10** is received from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit information on the determined external device **10** to the server (e.g., the intelligent server **200**). According to another embodiment, a command (e.g., a voice command) to display the response screen through an external device other than the determined external device **10** is received from the user, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit information on the determined external device **10** included in the command to the server (e.g., the intelligent server **200**).

According to various embodiments, in operation **508**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit information on the received user utterance voice to the server (e.g., the intelligent server **200**). For example, the information on the received user utterance voice may include at least one of a user utterance voice signal, a result of automatic voice recognition of the received user utterance voice signal by the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B), or a result of performing natural language understanding by the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) after automatic voice recognition of the user utterance voice signal.

According to various embodiments, in operation **509**, the server (e.g., the intelligent server **200** or the processor **601**) may obtain a response corresponding to the information on the received user utterance voice. For example, the response may include at least one of a response screen or a response voice.

According to various embodiments, the server (e.g., the intelligent server **200** or the processor **601**) may obtain response text corresponding to the information on the received user utterance voice using a natural language platform (e.g., the natural language platform **220**). For example, the server (e.g., the intelligent server **200** or the processor **601**) may obtain the response text using at least one module included in the natural language platform (e.g., the natural language platform **220**) on the basis of whether the information about the received user utterance voice is a user utterance voice signal, a result of automatic voice recognition of the received user utterance voice signal by the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B), or a result of performing natural language understanding by the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) after automatic voice recognition of the user utterance voice signal.

Although it is described in FIG. **5** that operation **508** of transmitting information on the user utterance voice is performed after operation **501** of receiving the user utterance voice, according to various embodiments, the operation of transmitting information on the user utterance voice may be simultaneously performed with operation **507** of transmitting the determined external device. According to various embodiments, in the case where information on the user utterance voice and information on the determined external device are transmitted together, operation **509** of obtaining a response to the user utterance voice may be performed after operation **507**.

According to various embodiments, in operation **510**, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen on the basis of the obtained response text and the information on one determined external device. For example, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen on the basis of the obtained response text and device type information, which is included in the ID information of the determined external device.

According to various embodiments, if the obtained response text is intended to request a response from the user, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen by further including a plurality of examples for selection of the user therein. As another example, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen by further including visual content related to the obtained response text therein.

According to various embodiments, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen on the basis of information about a display included in one determined external device (e.g., a size, a shape, or displayable colors of the display). For example, if the display included in the external device has a small size, the server (e.g., the intelligent server **200** or the processor **601**) may produce a response screen by shortening the response text.

According to various embodiments, the server (e.g., the intelligent server **200** or the processor **601**) may obtain a response voice corresponding to the response text through a text-to-speech module (e.g., the text-to-speech module **229**).

According to various embodiments, in operation **511**, the server (e.g., the intelligent server **200** or the processor **601**) may transmit the response screen and the response voice to the user terminal device **100**.

According to various embodiments, in operation **512**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit the response screen received from the server (e.g., the intelligent server **200**) to the external device **10**.

According to various embodiments, the external device **10** may display the response screen received from the user terminal device **100** in operation **513**, and the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may output the response voice in operation **514**.

According to various embodiments, the server (e.g., the intelligent server **200** or the processor **601**) may transmit the response text to the user terminal device **100** without converting the response text to a voice, and the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may convert the received response text to a voice, and may output a response voice.

According to various embodiments, the response voice may include information on the external device **10** so as to allow the user to view the external device **10**.

According to various embodiments, in the case where the external device **10** is able to communicate with the server (e.g., the intelligent server **200**) (for example, in the case where the external device **10** communicates with the intelligent server **200** to provide the artificial intelligence virtual assistant service), the server (e.g., the intelligent server **200** or the processor **601**) may transmit the response screen to the external device **10**.

According to various embodiments, after the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) transmits the response screen to the external device **10**, the user may input a manipulation command through the response screen displayed on the external device **10**. According to various embodiments, if a signal corresponding to the user manipulation command input by the user is received from the external device **10**, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may perform an operation corresponding to the user manipulation command.

According to various embodiments, if the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) switches to the state capable of providing a response screen through a display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) while the response screen is being displayed through the external device **10**, the user terminal device may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B).

For example, if the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) switches to the state capable of providing a response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) (e.g., the state in which the user terminal device is taken out of a pocket or bag) according to a sensed value obtained from at least one sensor (e.g., an illuminance sensor, a gyro sensor, or an acceleration sensor) while displaying the response screen through the external device **10**, or if the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) is activated, the user terminal device **100** may transmit a signal for stopping the display of the response screen to the external device **10**, and may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B), or may request the server (e.g., the intelligent server **200**) to transmit the response screen to the user terminal device **100**.

According to various embodiments, when the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) switches to the state capable of providing the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B), the user terminal device **100** may receive confirmation from the user on whether or not to provide the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B). For example, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may transmit a confirmation message to the external device **10** so as to display the confirmation message on the display of the external device **10**, or may output a voice making a request for confirmation through a speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the user terminal device **100** or an external speaker connected to the user terminal device **100**. According to various embodiments, when a user command regarding whether or not to provide the response screen through the display (e.g., the display **160**) is input, the user terminal device **100** (e.g., the processor **120** of the electronic device **101** in FIG. **1**A or the processor **120** of the user terminal device **100** in FIG. **1**B) may maintain the response screen displayed by the external device **10**, or may display the response screen on the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) on the basis of the input user command.

FIG. **6** is a diagram illustrating a network environment of an artificial intelligence virtual assistant service according to an embodiment.

According to various embodiments, the network environment of the artificial intelligence virtual assistant service may include an intelligent server **200**, a user terminal device (or an electronic device) **100**, and an IoT server **202**.

According to various embodiments, the intelligent server **200** may include a communication module **602** and a processor **601** that is operatively connected to the communication module **602**. According to various embodiments, the intelligent server **200** may communicate with the IoT server **202** and the user terminal device **100** through the communication module **602**.

According to various embodiments, the user terminal device **100** may include a communication module **190** (e.g., the communication module **190** in FIG. **1**A or the communication module **190** in FIG. **1**B) and a processor **120** that is operatively connected to the communication module **190**. According to various embodiments, the user terminal device **100** may communicate with at least one external device **102**, **104**, or **106** through the communication module **190**.

The communication module **190** may support wireless communication by device-to-device (D2D) methods such as Bluetooth™, BLE, Wi-Fi direct, Wi-Fi hot spot, a UWB signal, and wireless communication using an access point (AP) of Wi-Fi.

According to various embodiments, the user terminal device **100** may further include another element in addition to the elements shown in FIG. **6**. For example, the user terminal device **100** may further include at least one sensor.

According to various embodiments, the user terminal device **100** may determine the current status information of the electronic device {for example, the state in which a

response screen corresponding to a user utterance voice is unable to be provided through the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B (e.g., the state in which the user terminal device is inside a bag or pocket)} through a sensed value obtained through at least one sensor (e.g., an illuminance sensor, a gyro sensor, or an acceleration sensor).

As another example, the user terminal device **100** may further include at least one of the elements shown in FIG. **1**B (e.g., the microphone **150**, the speaker **155**, and the display **160**). Additionally, the IoT server **202** may include a communication module **604** and a processor **603** operatively connected to the communication module **604**. According to various embodiments, the IoT server **202** may communicate with at least one IoT device **605**, **606**, or **607** through the communication module **604**.

FIG. **7** is a diagram illustrating an operation of providing a screen by a server in an artificial intelligence virtual assistant service according to an embodiment.

According to various embodiments, in operation **710**, the server (e.g., the intelligent server **200** or the processor **601**) may receive, from a first external device (e.g., the electronic device **101** in FIG. **1**A or the user terminal device **100** in FIG. **1**B), information on a user utterance voice, current status information of the first external device, and current status information of at least one second external device (e.g., the external device **104** or **106**) connected to the first external device.

According to various embodiments, the information on the user utterance voice may be information on the user utterance voice received through a microphone included in the first external device or a microphone of the second external device **102** already connected to the first external device. According to various embodiments, the second external device already connected to the first external device may be a wearable device (e.g., wireless earphones).

For example, information on the user utterance voice may include a user utterance voice signal received by the first external device, a result of automatic voice recognition of the received user utterance voice signal by the first external device, or a result of performing natural language understanding by the first external device after automatic voice recognition of the user utterance voice signal.

According to various embodiments, the current status information of the first external device may include information on whether or not the first external device is able to provide a response screen through a display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) of the first external device.

According to various embodiments, the current status information of the first external device may include at least one of a sensed value obtained by the first external device or an inactivation period of a display of the first external device. For example, the current status information of the first external device may include at least one of a sensed value obtained through an illuminance sensor included in the first external device, a sensed value obtained through a proximity sensor, or an inactivation period of the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B).

According to various embodiments, the current status information of the first external device may further include the distance between the user and the first external device, which is obtained based on at least one of the intensity of the user utterance voice received through the microphone included therein or the strength of a signal (e.g., a UWB signal or a Bluetooth™ signal) with a wearable device already connected through wireless communication.

According to various embodiments, the current status information of at least one second external device (e.g., the external devices **104** and **106**) connected to the first external device may include at least one of a running application, whether or not video content is being played, strength of a communication signal (e.g., a Wi-Fi signal, a UWB signal, a Bluetooth™ signal, or a BLE signal), or a battery level in each second external device.

According to various embodiments, in operation **720**, the server may receive current status information of at least one IoT device (e.g., the IoT device **605**, **606**, or **607**) from the IoT server (e.g., the IoT server **202**) connected to the server. For example, the current status information of at least one IoT device may include at least one of a running application, whether or not video content is being played, strength of a communication signal (e.g., a Wi-Fi signal, a UWB signal, a Bluetooth™ signal, or a BLE signal), or a battery level in each IoT device.

According to various embodiments, in operation **730**, the server may determine whether or not the first external device is in the state capable of providing a response screen corresponding to the user utterance voice. For example, the server may determine whether or not the first external device is in the state capable of providing a response screen on the basis of the current status information of the first external device.

According to various embodiments, the server determine whether or not the first external device in the state capable of providing a response screen on the basis of the information, which is included in the current status information of the first external device, on whether or not the first external device is able to provide a response screen through a display of the first external device.

According to various embodiments, if at least one of conditions in which a sensed value obtained through an illuminance sensor of the first external device is less than a predetermined value, in which a sensed value obtained through a proximity sensor of the first external device is less than a predetermined value, or in which the display of the first external device remains in an inactive state for a predetermined period or more is satisfied, the server may determine that the response screen corresponding to the user utterance voice is unable to be provided through the display of the first external device (e.g., the state in which the device is inside a bag or pocket).

According to various embodiments, if the distance between the user and the first external device, which is included in the current status information of the first external device, is greater than or equal to a predetermined value, the server may determine that the response screen corresponding to the user utterance voice is unable to be provided through the display of the first external device.

According to various embodiments, in operation **740**, if the first external device is not in the state capable of providing the response screen, the server may determine one external device to display the response screen, among one or more second external devices (e.g., the external devices **104** and **106**) or among one or more IoT devices (e.g., the IoT devices **605**, **606**, and **607**).

For example, the server may determine the second external device or the IoT device, which is currently displaying a screen according to execution of an application or is currently displaying video content, or of which the strength of a communication signal and the battery level are less than predetermined values, to be the device that is unable to

display the response screen. For example, the server may determine the device whose display is available, whose battery level is greater than or equal to a predetermined value, and whose communication signal is strongest, among one or more external devices or one or more IoT devices, to be one external device to display the response screen.

According to various embodiments, if the result of automatic voice recognition of the user utterance voice includes information related to a device that is to provide a response corresponding to the user utterance voice, the server may determine the device included in the user utterance voice to be the one external device to display the response screen.

According to various embodiments, in operation **750**, the server may obtain a response screen to the user utterance voice. For example, the server may obtain response text corresponding to information on the received user utterance voice through an automatic speech recognition module (e.g., the automatic speech recognition module **221**), a natural language understanding module (e.g., the natural language understanding module **223**), or a natural language generator module (e.g., the natural language generator module **227**), which are included in a natural language platform (e.g., the natural language platform **220**),

According to various embodiments, the server may produce a response screen on the basis of the obtained response text and information of one determined external device. For example, the server may produce a response screen on the basis of the obtained response text and the device type information of the determined external device.

According to various embodiments, if the obtained response text is intended to request a response from the user, the server may produce a response screen by further including a plurality of examples for selection by the user. As another example, the server may produce a response screen by further including visual content related to the obtained response text.

According to various embodiments, the server may produce a response screen on the basis of information about a display included in one determined external device (e.g., a size, a shape, or displayable colors of the display). For example, if the display included in the external device has a small size, the server may produce a response screen by shortening the response text.

According to various embodiments, in operation **760**, the server may transmit the response screen to one determined external device.

According to various embodiments, if one determined external device supports an artificial intelligence virtual assistant function, the server may transmit the response screen to the one determined external device. Additionally, if one determined external device does not support an artificial intelligence virtual assistant function, the server may transmit the response screen to the first external device such that the first external device transmits the response screen to the one external device. For example, if one determined external device does not support an artificial intelligence virtual assistant function, the server may transmit the response screen to the first external device, and the first external device may transmit the received response screen to the one determined external device.

According to various embodiments, the server may output a request for confirmation from the user on whether or not to display the response screen on the one determined external device. For example, if a tablet is determined to be the external device to display the response screen, the server may output a voice saying "Do you want to display the screen on the tablet?" through a speaker (e.g., the sound output module **155** in FIG. **1**A or the speaker **155** in FIG. **1**B) included in the first external device or a speaker included in the second external device (e.g., the external device **102**) already connected to the first external device. According to various embodiments, when a command (e.g., a voice command) to display the response screen on the determined external device is received from the user, the server may transmit the response screen to the determined external device. In addition, a command (e.g., a voice command) to display the response screen through an external device other than the determined external device may be received from the user, and the server may transmit the response screen to the external device included in the command.

According to various embodiments, if the first external device switches to the state capable of providing the response screen through a display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) of the first external device while displaying the response screen through the one determined external device, the server may transmit the response screen to the first external device. For example, if the user terminal device **100** switches to the state capable of providing the response screen through the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) (e.g., the state in which the device is taken out of a pocket or bag) according to a sensed value obtained from at least one sensor (e.g., an illuminance sensor, a gyro sensor, or an acceleration sensor) of the first external device, or if a signal indicating that the display (e.g., the display module **160** in FIG. **1**A or the display **160** in FIG. **1**B) is activated is received, while displaying the response screen through the one determined external device, the server may transmit a signal for stopping the display of the response screen to the one determined external device, and may transmit the response screen to the first external device.

According to various embodiments, in the case where the first external device transmitted the response screen to one determined external device, if the first external device switched to the state capable of providing the response screen through the display of the first external device, the first external device may display the response screen through the display, instead of transmitting the response screen received from the server to the one determined external device. According to various embodiments, the first external device may transmit a signal for stopping the display of the response screen to the determined external device.

According to various embodiments, the user may input a manipulation command through the response screen displayed on the one determined external device while the one determined external device is displaying the response screen received from the server or the first external device. According to various embodiments, upon receiving a signal corresponding to a user manipulation command input by the user from the one determined external device, the server may perform an operation corresponding to the user manipulation command.

According to various embodiments, the server may obtain a response voice corresponding to the response text through a text-to-speech module (e.g., the text-to-speech module **229**), and may transmit the obtained response voice to the first external device.

According to various embodiments, the server may transmit the response text to the first external device without performing an operation of converting the response text into a voice, and the first external device may convert the received response text into a voice, and may output the same.

According to various embodiments, the response voice may include information on one determined external device so as to allow the user to view the one determined external device.

According to various embodiments, the server may transmit, to the first external device or one determined external device, a request for confirmation on whether or not to output the response voice to the user utterance voice through the one determined external device. For example, the server may transmit a voice request for confirmation on whether or not to output the response voice through one external device to the first external device, and the first external device may output the received voice request through a speaker included therein or a speaker of the second external device already connected to the first external device. In another embodiment, the server may transmit a request message screen for receiving confirmation on whether or not to output the response voice through one determined external device to the one determined external device, and the one determined external device may display the received request message screen.

According to various embodiments, if a command to output the response voice through one determined external device is received from the first external device or the one determined external device, the server may transmit the response voice to the one determined external device.

FIG. **8** is a diagram illustrating an operation of providing a screen by a server in an artificial intelligence virtual assistant service according to an embodiment.

According to various embodiments, in operation **801**, the user terminal device **100** may receive a user utterance voice.

According to various embodiments, in operation **802**, the user terminal device **100** may transmit, to a server **200** (e.g., the server **108** in FIG. **1**A or the intelligent server **200** in FIG. **1**B), the user utterance voice and current status information of the user terminal device **100** and at least one external device connected to the user terminal device **100**.

According to various embodiments, the server **200** may receive current status information of at least one IoT device (e.g., the IoT device **605**, **606**, or **607**) from an IoT server (e.g., the IoT server **202**). According to various embodiments, since operations **801** to **802** are the same as operation **710** in FIG. **7**, duplicate descriptions thereof will be omitted.

According to various embodiments, in operation **803**, the server **200** may obtain a response to the user utterance voice. For example, the response to the user utterance voice may include at least one of a response screen and a response voice. Operation **803** is the same as operation **509** in FIG. **5**, so a duplicate description thereof will be omitted. Although it is illustrated in FIG. **8** that operation **803** is performed before operation **804**, according to various embodiments, operation **803** may be performed after operation **804** or simultaneously with part thereof, or may be performed after/before operation **807** or simultaneously with part of thereof.

According to various embodiments, in operation **804**, the server **200** may determine whether or not the user terminal device **100** is able to display a response screen.

According to various embodiments, if the user terminal device **100** is able to display a response screen ("YES" in operation **804**), in operation **805**, the server **200** may transmit an obtained response to the user terminal device **100**. According to various embodiments, in operation **806**, the user terminal device **100** may display the response screen received from the server **200**, and may output a response voice.

According to various embodiments, if the user terminal device **100** is unable to display the response screen ("NO" in operation **804**), in operation **807**, the server **200** may determine the external device **10** to be the device to display the response screen. For example, the server **200** may determine the external device **10** to display the response screen on the basis of information on at least one external device, which is received from the user terminal device **100**.

Further, the server **200** may receive information on at least one external device, which is connected to the user terminal device **100**, from the user terminal device **100** in step **802**, and if the user terminal device **100** is unable to display the response screen ("NO" in step **804**), the server **200** may receive, from the user terminal device **100**, information on at least one external device connected to the user terminal device **100**.

According to various embodiments, in operation **808**, the server **200** may determine whether or not the external device **10** has an artificial intelligence virtual assistant function. According to various embodiments, if the external device **10** has an artificial intelligence virtual assistant function ("YES" in operation **808**), the server **200** may transmit the response screen to the external device **10** in operation **809**. According to various embodiments, in operation **810**, the external device **10** may display the response screen received from the server **200**.

According to various embodiments, if the external device **10** has an artificial intelligence virtual assistant function ("YES" in operation **808**), in operation **811**, the server **200** may transmit the response voice to the user terminal device **100**. According to various embodiments, in operation **812**, the user terminal device **100** may output the response voice received from the server **200**. According to various embodiments, the response voice may include information on the external device **10** so as to allow the user to view the external device **10**.

According to various embodiments, operation **810** in which the external device **10** displays the response screen may be performed simultaneously with at least part of operation **812** in which the user terminal device **100** outputs the response voice.

According to various embodiments, the server **200** may transmit, to the user terminal device **100** or the external device **10**, a request for confirmation on whether or not to output the response voice to the user utterance voice through the external device **10**. According to various embodiments, when a command to output the response voice through the external device **10** is received from the user terminal device **100** or the external device **10**, the server **200** may transmit the response voice to the external device **10**.

According to various embodiments, if the external device **10** does not have an artificial intelligence virtual assistant function ("NO" in operation **808**), in operation **813**, the server **200** may transmit a response including at least one of the response screen or the response voice to the user terminal device **100**. According to various embodiments, the user terminal device **100** may receive a response in operation **814**, and may transmit the response screen included in the received response to the external device **10** in operation **815**.

According to various embodiments, in operation **816**, the external device **10** may display the response screen received from the user terminal device **100**. According to various embodiments, in operation **812**, the user terminal device **100** may output the response voice simultaneously with at least part of operation **816**.

FIGS. **9** to **12** are diagrams illustrating an embodiment of an operation of providing a screen of an artificial intelli-

gence virtual assistant service according to the disclosure. According to various embodiments, at least one of an operation of selecting the device to provide a response screen or an operation of obtaining a response to a user utterance voice in FIGS. **9** to **12** may be performed by a user terminal device **100** or a server (e.g., the intelligence server **200**).

According to various embodiments, referring to (a) of FIG. **9**, the user terminal device **100** may receive the user utterance voice **910** through a already connected external device **102** (e.g., wireless earphones). For example, the user utterance voice **910** may be "Hi, Bixby, let me know the current location of Uber".

According to various embodiments, if it is determined that the user terminal device **100** is not in the state capable of providing a response screen to the user utterance voice **910** because the user terminal device **100** is inside a pocket **91**, the user terminal device **100** or the server may determine an external device **10** to display the response screen. For example, the external device **10** may be a smart watch including a display.

According to various embodiments, a response voice **920** (e.g., "Uber is arriving in 3 minutes. Please check the detailed location on the watch.") may be output through an external device **102** already connected to the user terminal device **100**, and a response screen **930** may be displayed through the determined external device **10**. According to various embodiments, the response voice may include information on the external device **10** so as to allow the user to view the external device **10**.

According to various embodiments, referring to (b) FIG. **9**, the user terminal device **100** may receive a user utterance voice **910** through an external device **102** (e.g., wireless earphones) already connected thereto. For example, the user utterance voice **910** may be "Hi, Bixby, let me know the current location of Uber".

According to various embodiments, if it is determined that the response screen is able to be provided through the user terminal device **100**, the user terminal device **100** or the server may output a response voice **940** (e.g., "Uber is arriving in 3 minutes.") through the external device **102** already connected to the user terminal device **100**, and the response screen **950** may be displayed through the display included in the user terminal device **100**.

According to various embodiments, referring to FIG. **10**, the user terminal device **100** may receive a user utterance voice **1010** through an external device **102** (e.g., wireless earphones) already connected thereto. For example, the user utterance voice **1010** may be "Hi, Bixby, show me my resume".

According to various embodiments, if it is determined that the user terminal device **100** is not in the state capable of providing a response screen to the user utterance voice **1010** because the user terminal device **100** is inside a bag **11**, the user terminal device **100** or the server may determine an external device **10** to display the response screen. For example, the external device **10** may be a tablet including a display.

According to various embodiments, the user terminal device **100** or the server may output a request **1020** for confirmation on whether or not to display the response screen through the determined external device **10**. For example, the user terminal device **100** or the server may output a voice saying "Do you want to see it on the tablet?" through an external device **102**.

According to various embodiments, if a command **1030** (e.g., "Yes, I do") to display the response screen through the determined external device **10** is received from the user, the user terminal device **100** or the server may output the response voice **1040** (e.g., "The file Resume_0304 was opened") through the external device **102** already connected to the user terminal device **100**, and may display the response screen **1050** on the display of the external device **10**.

According to various embodiments, the response voice **1040** (e.g., "The file Resume_0304 was opened on the tablet") may include information on the external device **10** (e.g., the tablet) so as to allow the user to view the external device **10**.

According to various embodiments, referring to FIG. **11**, the user terminal device **100** may receive a user utterance voice **1110** through an external device **102** (e.g., wireless earphones) already connected thereto. For example, the user utterance voice **1110** may be "Hi, Bixby, show me my resume".

According to various embodiments, if it is determined that the user terminal device **100** is not in the state capable of providing a response screen to the user utterance voice **1110** because the user terminal device **100** is inside a bag **11**, the user terminal device **100** or the server may determine an external device **104** to display the response screen. For example, the external device **104** may be a TV set including a display.

According to various embodiments, the user terminal device **100** or the server may output a request **1120** for confirmation on whether or not to display the response screen through the determined external device **104**. For example, the user terminal device **100** or the server may output a voice saying "Do you want to see it on TV?" through the external device **102**.

According to various embodiments, if a command **1130** to display the response screen through an external device other than the determined external device **104** (e.g., No, open it on the tablet) is received from the user, the user terminal device **100** or the server may output the response voice **1140** through the external device **102** already connected to the user terminal device **100** (e.g., "The file Resume_0304 was opened"), and may display the response screen **1150** on the display of the external device **10** (e.g., the tablet) included in the received command **1130**.

According to various embodiments, referring to FIG. **12**, the user terminal device **100** may receive a user utterance voice **1210** through the external device **102** (e.g., wireless earphones) already connected thereto. For example, user utterance voice **1210** may be "Hi, Bixby, show me my resume".

According to various embodiments, if it is determined that the user terminal device **100** is not in the state capable of providing a response screen to the user utterance voice **1210** because the user terminal device **100** is inside a bag **11**, the user terminal device **100** or the server may determine an external device **104** to display the response screen. For example, the external device **104** may be a TV set including a display.

According to various embodiments, the user terminal device **100** or the server may output a request **1220** for confirmation on whether or not to display the response screen through the determined external device **104**. For example, the user terminal device **100** or the server may output a voice request **1220** such as "Do you want to see it on TV?" through an external device **102**.

According to various embodiments, if a command **1230** to display the response screen through an external device other than the determined external device **104** (e.g., No, open it on

the tablet) is received from the user, the user terminal device **100** or the server may output the response voice **1240** through the external device **102** already connected to the user terminal device **100** (e.g., "The file Resume_0304 was opened"), and may display the response screen **1250** on the display of the external device **10** (e.g., the tablet) included in the received command **1230**.

According to various embodiments, the user terminal device **100** may receive a new user utterance voice **1260** through an external device **102** (e.g., wireless earphones) already connected thereto. For example, the new user utterance voice **1260** may be "Hi, Bixby, play Good day of IU back to me"

According to various embodiments, if it is determined that the response screen does not need to be provided as a result of performing an automatic voice recognition operation and a natural language understanding operation on the new user utterance voice **1260**, the user terminal device **100** or the server may output a response voice **1270** (e.g., "Playing Good day of IU") through the external device **102** already connected to the user terminal device **100**, instead of determining the external device to provide the response screen.

According to various embodiments, a user terminal device may include: a display; at least one sensor; a communication module; and a processor operatively connected to the display, the at least one sensor, and the communication module, wherein the processor may be configured, if a user utterance voice is received, to determine whether or not a response screen corresponding to the user utterance voice is able to be provided through the display on the basis of at least one of a sensed value obtained from the at least one sensor or an inactive period of the display, if it is determined that the response screen is unable to be provided through the display, to receive current status information of at least one external device connected to the user terminal device through the communication module, to determine one external device to display the response screen on the basis of the current status information of the at least one external device, to obtain the response screen to the user utterance voice, and to transmit the response screen to the one external device through the communication module.

According to various embodiments, the processor may include an automatic speech recognition module, a natural language understanding module, and a natural language generator module, and may be configured to obtain response text to the received user utterance voice using the automatic speech recognition module, the natural language understanding module, and the natural language generator module, produce a response screen on the basis of the obtained response text and information on a display included in the one external device, and transmit the produced response screen to the one external device.

According to various embodiments, the processor may be configured to transmit information on the one external device and information on the user utterance voice to a server, obtain a response screen and a response voice to the user utterance voice from the server, transmit the response screen to the one external device, and output the response voice through a speaker of the user terminal device or an external speaker already connected to the user terminal device.

According to various embodiments, the at least one sensor may include an illuminance sensor, and the processor may be configured to determine whether or not the response screen is able to be provided through the display on the basis of an illuminance value obtained through the illuminance sensor.

According to various embodiments, the current status information of the at least one external device may include at least one of a running application, whether or not video content is being played, strength of a communication signal, or a battery level in the at least one external device.

According to various embodiments, the processor may be configured to output a request for confirmation on whether or not to display the response screen on the one determined external device through a speaker of the user terminal device or an external speaker already connected to the user terminal device, and if a command to display the response screen through a second external device other than the one determined external device is received in response to the request, to transmit the response screen to the second external device other than the one determined external device.

According to various embodiments, the processor may be configured, if the display switches to a state capable of providing the response screen after transmitting the response screen to the one external device, to transmit a signal for stopping the display of the response screen to the one external device and to display the response screen on the display.

According to various embodiments, the processor may be configured to receive a user utterance voice, which is obtained using an external microphone connected to the user terminal device, through the communication module and determine one external device to display the response screen by further considering the location of the external microphone.

According to various embodiments, the processor may be configured, if a signal corresponding to a user manipulation command is received from the one external device after transmitting the response screen to the one external device, to perform an operation corresponding to the user manipulation command.

According to various embodiments, a server may include: a communication module; and a processor operatively connected to the communication module, wherein the processor may be configured to receive, from a first external device that receives a user utterance voice, information on the user utterance voice, current status information of the first external device, and current status information of at least one second external device connected to the first external device through the communication module, to receive current status information of at least one IoT device from an IoT server connected to the server through the communication module, based on sensing information of the first external device, to determine whether or not the first external device is in a state capable of providing a response screen corresponding to the user utterance voice, if it is determined that the first external device is not in the state capable of providing the response screen, to determine one external device to display the response screen on the basis of at least one piece of the current status information of the at least one second external device or the current status information of the at least one IoT device, to obtain the response screen to the user utterance voice, and to transmit the response screen corresponding to the user utterance voice to the one external device through the communication module.

According to various embodiments, the processor may be configured to transmit the response screen to the one external device if the one external device supports an artificial intelligence virtual assistant function, and transmit the response screen to the first external device such that the first

external device transmits the response screen to the one external device if the one external device does not support the artificial intelligence virtual assistant function.

According to various embodiments, the processor may include an automatic speech recognition module, a natural language understanding module, and a natural language generator module, and may be configured to obtain response text to the received user utterance voice using the automatic speech recognition module, the natural language understanding module, and the natural language generator module, produce a response screen on the basis of the obtained response text and information on a display included in the one external device, and transmit the produced response screen to the one external device.

According to various embodiments, the processor may be configured, if a result of natural language understanding of the user utterance voice includes information related to a device that is to provide a response corresponding to the user utterance voice, to determine the device included in the user utterance voice to be the one external device to display the response screen.

According to various embodiments, the current status information of the first external device may include at least one of an illuminance value obtained by the first external device or an inactivation period of a display of the first external device.

According to various embodiments, the current status information of the at least one second external device or the current status information of the at least one IoT device may include at least one of a running application, whether or not a video is being played, strength of a communication signal, or a battery level in the at least one second external device or the at least one IoT device.

According to various embodiments, the processor may be configured to transmit, to the first external device, a request for confirmation on whether or not to display the response screen on the one determined external device, and if a command to display the response screen through a second external device other than the one determined external device is received from the first external device in response to the request, to transmit the response screen to the second external device other than the one determined external device.

According to various embodiments, the processor may be configured, if the first external device switches to a state capable of providing the response screen after transmitting the response screen to the one external device, to transmit a signal for stopping the display of the response screen to the one external device and to transmit the response screen to the first external device.

According to various embodiments, the processor may be configured, if a signal corresponding to a user manipulation command is received from the one external device after transmitting the response screen to the one external device, to perform an operation corresponding to the user manipulation command.

According to various embodiments, the processor may be configured to transmit, to the first external device, a response voice to the user utterance voice.

According to various embodiments, the processor may be configured to transmit, to the first external device or the one external device, a request for confirmation on whether or not to output the response voice to the user utterance voice through the one external device, and if a command to output the response voice through the one external device is received in response to the request, to transmit the response voice to the one external device.

The electronic device according to various embodiments may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

It should be appreciated that various embodiments of the disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C," may include any one of, or all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as "1st" and "2nd," or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term "operatively" or "communicatively", as "coupled with," "coupled to," "connected with," or "connected to" another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

As used in connection with various embodiments of the disclosure, the term "module" may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, "logic," "logic block," "part," or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

Various embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may invoke at least one of the one or more instructions stored in the storage medium, and execute it. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the term "non-transitory" simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

A method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded

as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities, and some of the multiple entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components or operations may be omitted, or one or more other components or operations may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

While the present disclosure has been particularly shown and described with reference to certain embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the disclosure as defined by the appended claims and their equivalents.

According to various embodiments, in the case where visual information is unable to be provided through the display of the electronic device providing an artificial intelligence virtual assistant service, it is possible to provide visual information through a display of a neighboring electronic device.

According to various embodiments, in the case where a display of a neighboring electronic device includes a touch panel, it is possible to receive a user manipulation command through a touch.

Accordingly, the artificial intelligence virtual assistant service is able to provide a highly complete experience of the artificial intelligence virtual assistant service even when visual information is unable to be provided through the display of the electronic device.

In addition, various effects identified directly or indirectly through this document may be provided.

The invention claimed is:

1. A user terminal device comprising:

a display;

at least one sensor;

a communication module; and

a processor operatively connected to the display, the at least one sensor, and the communication module,

wherein the processor is configured to:

based on receiving a user utterance voice, determine whether a response screen corresponding to the user utterance voice is able to be provided through the display on a basis of at least one of a sensed value obtained from the at least one sensor or an inactive period of the display,

based on determining that the response screen is unable to be provided through the display, receive current status information of at least one external device connected to the user terminal device through the communication module,

determine one external device among the at least one external device to display the response screen on a basis of the current status information of the at least one external device,

obtain the response screen to the user utterance voice, and

transmit the response screen to the one external device through the communication module.

2. The user terminal device of claim **1**, wherein the processor comprises an automatic speech recognition module, a natural language understanding module, and a natural language generator module, and is further configured to,

obtain response text to the received user utterance voice using the automatic speech recognition module, the natural language understanding module, and the natural language generator module,

produce a response screen on a basis of the obtained response text and information on a display included in the one external device, and

transmit the produced response screen to the one external device.

3. The user terminal device of claim **1**, wherein the processor is further configured to:

transmit information on the one external device and information on the user utterance voice to a server,

obtain a response screen and a response voice to the user utterance voice from the server,

transmit the response screen to the one external device, and

output the response voice through a speaker of the user terminal device or an external speaker already connected to the user terminal device.

4. The user terminal device of claim **1**, wherein the at least one sensor comprises an illuminance sensor, and

wherein the processor is further configured to determine whether the response screen is able to be provided through the display on a basis of an illuminance value obtained through the illuminance sensor.

5. The user terminal device of claim **1**, wherein the current status information of the at least one external device comprises information on at least one of a running application, whether video content is being played, strength of a communication signal, or a battery level in the at least one external device.

6. The user terminal device of claim **1**, wherein the processor is further configured to:

output a request for confirmation on whether to display the response screen on the one external device through a speaker of the user terminal device or an external speaker already connected to the user terminal device, and

based on receiving a command to display the response screen through a second external device other than the one external device in response to the request, transmit the response screen to the second external device other than the one external device.

7. The user terminal device of claim **1**, wherein the processor is further configured to, based on an electronic device changing to a state capable of providing the response screen through the display after transmitting the response

screen to the one external device, transmit a signal for stopping displaying the response screen to the one external device and display the response screen on the display.

8. The user terminal device of claim **1**, wherein the processor is further configured to:

receive a user utterance voice, which is obtained using an external microphone connected to the user terminal device, through the communication module, and

determine one external device to display the response screen by further considering a location of the external microphone.

9. The user terminal device of claim **1**, wherein the processor is further configured to, based on receiving a signal corresponding to a user manipulation command from the one external device after transmitting the response screen to the one external device, perform an operation corresponding to the user manipulation command.

10. A server comprising:

a communication module; and

a processor operatively connected to the communication module,

wherein the processor is configured to:

receive, from a first external device that receives a user utterance voice, information on the user utterance voice, current status information of the first external device, and current status information of at least one second external device connected to the first external device through the communication module,

receive current status information of at least one Internet of things (IoT) device from an IoT server connected to the server through the communication module,

based on sensing information of the first external device, determine whether the first external device is in a state capable of providing a response screen corresponding to the user utterance voice,

based on determining that the first external device is not in the state capable of providing the response screen, determine one external device among at least one external device to display the response screen on a basis of at least one piece of the current status information of the at least one second external device or the current status information of the at least one IoT device,

obtain the response screen to the user utterance voice, and

transmit the response screen corresponding to the user utterance voice to the one external device through the communication module.

11. The server of claim **10**, wherein the processor is further configured to:

transmit the response screen to the one external device based on the one external device supporting an artificial intelligence virtual assistant function, and

transmit the response screen to the first external device such that the first external device transmits the response screen to the one external device based on the one external device not supporting the artificial intelligence virtual assistant function.

12. The server of claim **10**, wherein the processor comprises an automatic speech recognition module, a natural language understanding module, and a natural language generator module, and is further configured to:

obtain response text to the received user utterance voice using the automatic speech recognition module, the natural language understanding module, and the natural language generator module,

produce a response screen on a basis of the obtained response text and information on a display included in the one external device, and

transmit the produced response screen to the one external device.

13. The server of claim **10**, wherein the processor is further configured to, based on a result of natural language understanding of the user utterance voice comprising information related to a device that is to provide a response corresponding to the user utterance voice, determine the device included in the user utterance voice to be the one external device to display the response screen.

14. The server of claim **10**, wherein the current status information of the first external device comprises at least one of an illuminance value obtained by the first external device or an inactivation period of a display of the first external device.

15. The server of claim **10**, wherein the current status information of the at least one second external device or the current status information of the at least one IoT device comprises information on at least one of a running application, whether a video is being played, strength of a communication signal, or a battery level in the at least one second external device or the at least one IoT device.

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